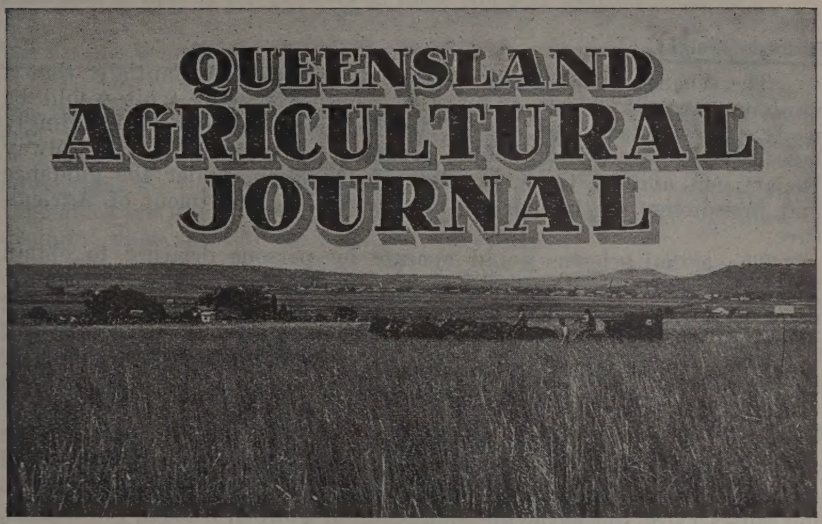
ANNUAL RATES OF SUBSCRIPTION.

Farmers, Graziers, Horticulturists, and Schools of Arts, One Shilling. Members of Agricultural Societies, Five Shillings, including postage. General Public, Ten Shillings, including postage.



VOL XLIII. 1 FEBRUARY, 1935. PART 2

Event and Comment.

Fruit for Distant Country Dwellers.

UNDER a scheme which has been approved by the State Cabinet, fresh fruit and vegetables will be delivered to people in the distant parts of the State by the Committee of Direction of Fruit Marketing at a quoted price, and the freight will be only 1s. a half-bushel case, with a reduction for larger quantities, no matter how far the fruit and vegetables have to be carried. Thus the bogey of lack of vitamins through difficulty in obtaining a regular supply of fresh fruit and vegetables will be swept away. All one has to do, under the new scheme, is to place an order, together with payment, with the nearest station-master or official, in charge of a station, who will be able to quote a standard price for what is required.

The Minister for Agriculture and Stock, Hon. Frank W. Bulcock, said, in the course of a recent announcement, that towards the end of last year Mr. H. S. Hunter, an officer of the markets branch of the Department, had been detailed to make a special investigation into the possibilities of instituting a scheme for the distribution of fresh fruits, more particularly to the northern and western areas of the State.

Mr. Hunter discussed matters with the Committee of Direction of Fruit Marketing, and with officers of the Railway Department, and finally a scheme, involving the co-operation of all three organisations, was evolved, which had now received the approval of the Cabinet.

Reduced Freight.

The scheme, Mr. Bulcock continued, provided substantially that a minimum freight charge of 1s. a half-bushel case of fruit would be made, and with larger orders the freight would become correspondingly less. This price would include freight and service by the Railway Department and by the Committee of Direction, under the guidance and jurisdiction of the markets branch of the Department of Agriculture.

The actual scheme would operate by persons desiring to obtain fruit placing an order with the local station-master or officer in charge of wayside stations. The order must be accompanied by cash, and would be transmitted to Brisbane for execution by the Committee of Direction. A standard price list would be furnished, and the fruit would be forwarded in the most expeditious manner possible.

This scheme offered an opportunity to people in all parts of the State to obtain cheap fruit, merely by placing an order with the local railway official. The transport cost of a half-bushel case of fruit, including sales service, to Charleville, Cunnamulla, Quilpie, Biloela, Barcaldine, Longreach, Winton, Mackay, Proserpine, Townsville, Hughenden, Cairns, Atherton, Mount Isa, and intermediate stations covered by the scheme would be at a flat rate of 1s., involving in the case of Atherton railway transit equal to 1,309 miles, and in the case of Mount Isa 1,619 miles.

The scheme would operate at all railway stations west of Toowoomba, west of Warwick, from and including Gayndah to Monto, from and including Beecher to Monto and stations north and west of Rockhampton.

Quotations for the various fruits in season would be displayed from time to time on the notice boards at these railway stations, showing the prices at which the different kinds of fruit would be delivered.

Mr. Bulcock added that the scheme would embrace also the distribution of green vegetables, quotations for which would be displayed at railway stations, as in the case of fruit. All public and semi-public organisations in country districts were being invited to co-operate in the scheme.

The initial response to the scheme has been most gratifying. Numerous orders are coming to hand, many of which are from consumers served by the most distant stations on the far Northern and Western railway systems. There are indications that the residents of outback areas are co-operating to the fullest extent in the interests of the public health of those places. From information to hand, it is understood that private carriers are responding to the invitation of local bodies to convey from the railway to the inland consumer, at special rates, consignments despatched under the scheme.

The special half-bushel pack of assorted vegetables is proving most popular. It provides variety at a moderate cost, with a minimum of

waste. The adoption of the half-bushel case as the basis of the scheme has been done to meet the requirements of the average household. Even such fruits as bananas and pineapples are being put up in special half-bushel packs. If the scheme should provide a means whereby more fruit and vegetables can be consumed in country districts, advantage must accrue also to the growers in these times of glutted markets.

The Scheme Commended.

"It will be a very great godsend to everyone out in those districts," was the comment of a Brisbane doctor who has had considerable experience in the West. He said that of course everyone with the means was able to get fruit in the West, but the scheme certainly had big advantages for the poorer people. There was difficulty in getting fresh vegetables out there, and they were a big item, especially in times of drought, when the Chinese market gardens failed.

Medical research has taught the world a lot concerning diet in the last twenty years. It has shown that people may be fed abundantly with heating and energising foods, and yet may be ill-fed because they may not be receiving certain elements essential for the promotion of growth and the maintenance of the body's defences against various infections, and that this deficiency in their diet, which could scarcely be measured, may show itself in very grave diseases. Dr. E. Hirschfeld some time ago, in an address before the Royal Society of Queensland, succeeded in directing general public attention to the fact that these discoveries concern the welfare of Queenslanders very closely, and particularly those who are maintaining our greatest rural industry in the pastoral areas of the far West. To defective diet, and especially to the lack of fruit and vegetables, Dr. Hirschfeld ascribed the prevalence of Barcoo rot in the West and anæmia and lowered vitality among children. He also suggested that the incidence of ophthalmia might be much reduced by giving children more foods that supply vitamin A. Milk, cream, and butter are rich in this important vitamin; consequently, people living in our towns and dairying districts rarely suffer a lack of it. Drought in western districts, however, means that nearly everyone, including mothers and children, must go short of vitamin A so long as they depend for it on milk and cream and butter; but from fruit and many vegetables they could obtain this element on which the body relies for the maintenance of health. Dr. Hirschfeld's views are supported by many medical authorities, including Dr. Harvey Sutton, who has remarked on the western retreat of ophthalmia in New South Wales before the advance of settlement, and by Dr. A. Jefferis Turner, Director of the State Department of Infant and Child Welfare, who has been disseminating as widely as possible instruction concerning the vitamin values of foods.

In a subsequent address to Parliamentary representatives of western constituencies, Dr. Hirschfeld urged that the people of the West should be educated in the use of such vitamin-laden foods as fresh, green vegetables, fresh fruits, tomatoes, milk, butter, eggs, and other comestibles. He mentioned those foods particularly, for they are often difficult and certainly expensive to obtain. "Everyone who has lived in the West," he said, "knows what a heartbreaking job it is to grow vegetables without watering them every day." Our first business, therefore, was to make vegetables and fruit procurable in the western country regularly and at reasonable prices.

Red Scale of Citrus.

By W. A. T. SUMMERVILLE, M.Sc., Assistant Entomologist.

OF the insects which attack citrus trees throughout the world probably none is more feared by growers than the red scale, and in so far as Queensland is concerned it must be counted as one of the most important factors limiting the production of citrus fruits. Other pests and diseases annually cause heavier losses over restricted areas or operate more extensively for limited periods, but red scale, in addition to being definitely the most important pest in some of the best citrus districts, is an ever-present menace in all. Even in those parts where it is ordinarily of but little consequence, as soon as conditions become suitable, which happens quite frequently in most parts, the scale quickly asserts itself and takes heavy toll of both trees and crop. On the whole, however, considering that the climatic conditions are theoretically so favourable for the development of the pest, Queensland orchardists must be considered fortunate that their losses are not much greater than is actually the case.

Description.

Actually, on the tree the insect itself is not usually seen, as whilst it is still of but minute size the insect exudes a secretion which completely covers the body. This secretion, or scale, as it is usually called, is of parchment-like texture and is only semi-translucent, and thus effectively hides the body of the insect from view. The scale of the female is circular in outline, slightly flattened at the margins, raised to a point towards the centre, and measures one-tenth of an inch in diameter in full-grown individuals. The central point is commonly of lighter colour than the remainder. The scale of the male is elongate and the raised portion, instead of being at the centre, is found towards the anterior or head end. Otherwise the scales of the sexes are similar. Though for most specimens the vernacular name describes the pest quite well, variations do occur, and at times the colour may appear reddish-brown or less often almost grey.

If the scale be removed from the female the insect is found to be roughly circular in outline, fat, and sluggish-looking, and generally of a deep-yellow or creamy-yellow colour. The female is legless and the most conspicuous feature is the structure of the mouth parts. These are rather complicated, but under a low-power lens appear to form a long, slender tube fitted for piercing, the length of which commonly easily exceeds that of the insect's body. The adult male is very different from the female, being a minute elongate creature with long legs and a pair of exceedingly delicate wings which are so fine that the slightest touch will tear them, and even the lightest breeze may dislodge them from the insect's body. The male again differs from his mate in that he has no mouth parts, the place of these having been taken during development by a pair of simple eyes. The male, of course, cannot feed and does not live long; probably twenty-four hours would be the longest adult life under ideal circumstances.

Life History and Habits.

The female does not lay eggs, but gives birth to living young, which remain for a day or two beneath the scale of the mother and then wander out to seek a feeding site. As a general rule they do not migrate far,

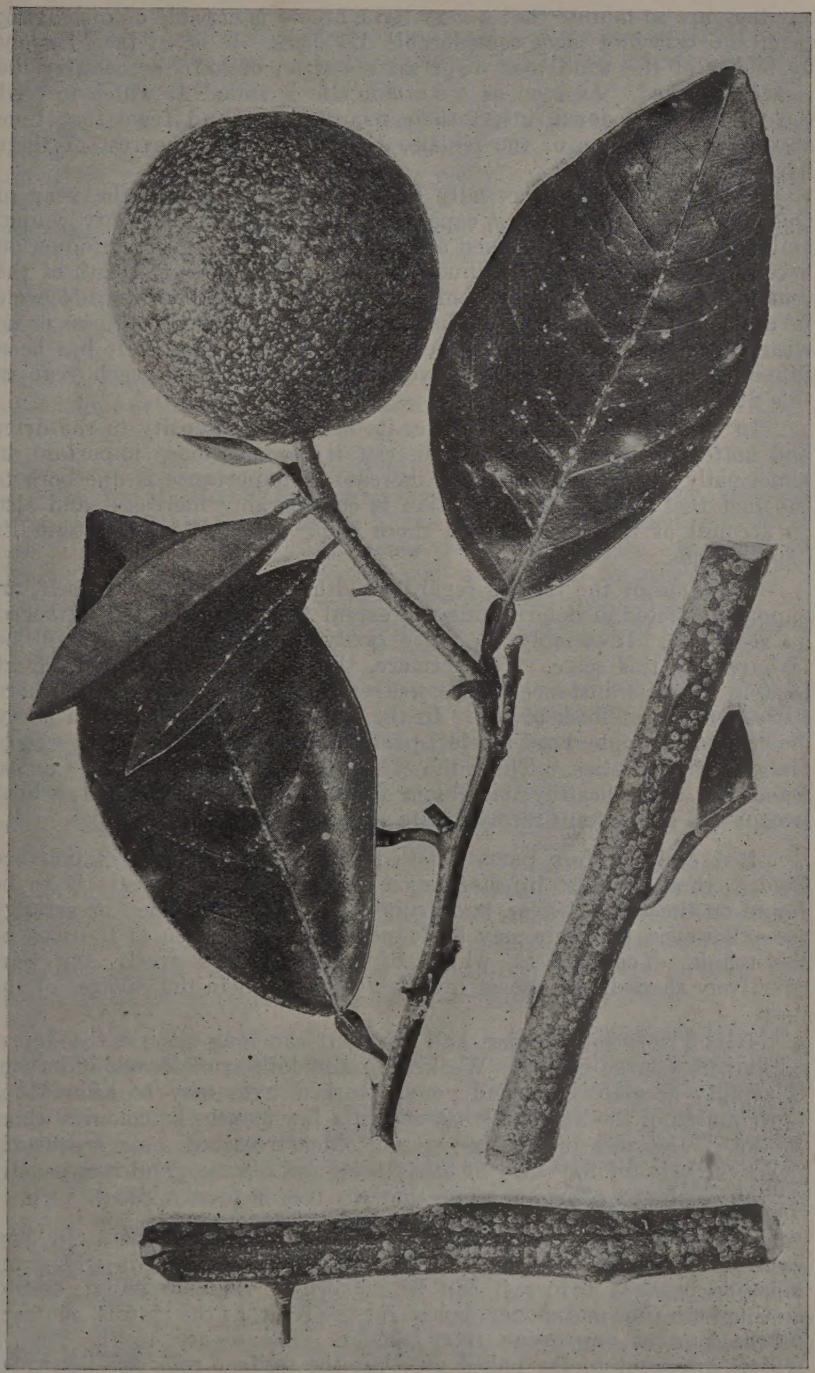


Plate 67.
Red Scale, showing infestation of fruit, foliage, and woody twigs.

but they are so minute that a very light breeze is capable of dislodging them and carrying them considerable distances. It is, in fact, largely by means of the wind that dispersal about an orchard or countryside is accomplished. As soon as a suitable site is found at which to feed the young settle down, insert their mouth parts, and from that time onwards, in the case of the female, do not move for the rest of their lives.

Red scale breeds practically continuously throughout the year in Queensland. Each female is capable of producing about eighty young, and these emerge over a period of about fifty days. Once reproduction is commenced it goes on continuously until just before the death of the female. As the great majority of the individuals complete the life cycle in approximately sixty days during the warmer weather, there is no clearly defined succession of generations. Experimentally it has been found that normally there are five complete generations each year in this State.

In Queensland the pest reaches its maximum intensity in the drier and hotter parts, and in every district it becomes more important in abnormally hot, dry times. The increase in importance is due both to the fact that effective reproduction is considerably increased and also on account of the trees at such times being less able to withstand its depredations.

The state of the tree as regards health and vigour is, in itself, an important factor in determining the extent to which it will be attacked by red scale. Invariably the more sickly a tree the more it will be favoured by this scale. Furthermore, the pest is usually confined at least in the first instance to the weaker and more woody parts where there is no great flush of sap. In the same way varieties which carry much tender supple wood are less prone to attack than the more woody and harsh varieties. Thus the free-growing Emperor of Canton mandarin, when healthy, is seldom found to harbour the pest, whilst lemons and grape fruit rarely fail to support appreciable colonies.

Red scale prefers parts exposed to the sun to those which are shaded, thus the first infestation on normally foliaged trees is to be found on the twigs, leaves, and fruit (Plate 67). On open or scraggy trees, however, the scale may be found on all parts even at the base of the trunk. Young trees, which, of course, have scarcely any part effectively shaded, are almost invariably subjected to the ravages of the pest.

It is a voracious feeder, and no plant can long sustain the depredations of a large colony. Weakening and killing of leaves and twigs is rapidly accomplished, and young worked trees may be killed back to the union of the bud and stock within a few months by colonies which cannot be considered very large. On older trees red scale frequently paves the way for the entry of other pests and diseases, and it is usually by the combined efforts of these that the tree is finally killed.

When infesting the fruit, though direct damage is done, in most cases the principal objection is that the fruit is rendered unsightly and must be brushed before it can be marketed. This brushing, besides costing both time and money, is bad for the fruit, as the rind is, contrary to the general impression, very tender. The injury to the rind is seldom apparent to the naked eye, but the surface cells are disrupted and this facilitates the entry of mould fungi and thus leads to loss of

fruit. This is an indirect effect of the scale but the loss must be attributed mainly to the pest. The direct effects are chiefly arrested development and reduction in size.

Red scale breeds freely on fruit stored after harvesting and the young crawl from fruit to fruit and box to box. As lemons are usually stored for a few months after being picked, this is a most important point, for one badly-infested fruit may lead to the whole consignment becoming affected. Care must therefore always be taken to see that no fruit harbouring living red scale is included in a storage lot.

The pest is attacked by a number of natural enemies, and at times these certainly accomplish an appreciable measure of control. However, it is rarely possible to rely on natural enemies to materially reduce the population once this has assumed pest proportions, and growers generally must adopt artificial means of control.

Control.

The first step in the fight against red scale in humid coastal districts is to attend to the general health of the tree. It may be that some other pest or disease is adversely affecting the tree, but more commonly all that is required to reduce the red scale population to insignificance is the judicious use of fertilizers coupled with good cultural practice. Of course, direct methods of control will also have to be used in these cases in the first instance.

In drier districts where the insect is a pest of otherwise healthy trees, or in other parts when the health of the tree is being attended to, artificial control may be accomplished by fumigation or by the use of certain sprays. Where conditions permit of the operation, fumigation with hydrocyanic acid gas is to be recommended as the best method of combating the pest. Oil sprays, preferably white oils, or resin-caustic soda-fish oil mixture may also be used with success.

As important as the choice of insecticide is the choice of time of application. Even if an excellent kill be obtained it does not necessarily follow that a lasting control will be established. If the control operations are carried out just before a period of prolific reproduction, it is obvious that the population may be again built up quickly.

By far the best time to combat red scale in Queensland is from the middle of March to early in April. If a good control be established at this time, even in the most severely affected districts, the trees will normally remain commercially free of the pest for at least twelve months. The later the operation the better, but it must always be remembered that red scale may require a month or more to fall from the fruit after death and the fruit may still require brushing unless a sufficiently long interval elapse between treatment and harvesting. Further, oil sprays if used too late tend to interfere with the artificial colouring, and late application of this class of spray should, therefore, be avoided on those early varieties which normally have their sweet juice content some time before the colour turns. In western districts the scale may build up large populations as early as January. All that can be done then is to water the trees as heavily as other conditions permit and in this way hold the condition of the trees as long as possible.

Young trees which are heavily infested when they arrive from the nursery should not be accepted, as such trees are very liable to be either killed altogether or stunted during their early life, and are thus never satisfactory. Any young trees may carry a light infestation and this does not matter greatly as it will be found that with most varieties the infestation is thrown off as soon as the trees become established. Light oil sprayings may be given to young trees, but care must be taken. The soil round the base of the trunk should be hilled up during the spraying and then pulled back. This prevents any accumulation of oil round the union or close to the roots where it has far-reaching ill-effects.

QUEENSLAND SHOW DATES, 1935.

February.

Stanthorpe, 6 to 8.
Killarney, 15 and 16.
Clifton, 27 and 28.

March.

Allora, 6 and 7.
Milmerran, 12.
Goombungee, 15.
Pittsworth, 20 and 21.
Warwick, 26 to 28.

April.

Toowoomba, 1 to 4.
Tara—Show 3, Campdraft 4.
Dalby, 10 and 11.
Crow's Nest, 10 and 11.
Oakey, 13.
Kingaroy, 11 and 12.
Chinchilla, 16 and 17.
Nanango, 16 and 17.
Miles, 24.
Sydney, 15 to 24 April.
Dirranbandi, 24 and 25.
Rosewood Campdraft, 27.
Taroom Campdraft, 29.

May.

Wallumbilla, 1 and 2.
Taroom, 1 and 2.
Beaudesert, 1 and 2; Campdraft, 3 and 4.
Wondai, 2 and 3.
Goondiwindi, 3 and 4.
Longreach, 6 to 9.
Murgon, 9 to 11.
Blackall, 13 to 15.
Mitchell, 15 and 16.
Mundubbera, 15 and 16.
Goomeri, 15 and 16.
Barcaldine, 21 and 22.
Ipswich, 21 to 24.
Gympie, 22 and 23.
Biggenden, 23 and 24.
Toogoolawah, 24 and 25.
Kalbar, 25.
Maryborough, 28 to 30.

June.

Marburg, 1 to 3.
Wowan, 6 and 7.
Bundaberg, 6 to 8.
Lowood, 7 and 8.
Boonah, 12 and 13.
Esk, 14 and 15.
Warrilview, 15.
Rockhampton, 18 to 22.
Mackay, 25 to 27.
Laidley, 26 and 27.
Proserpine, 28 and 29.

July.

Gatton, 3 and 4.
Bowen, 3 and 4.
Ayr, 5 and 6.
Townsville, 9 to 11.
Cleveland, 12 and 13.
Rosewood, 12 and 13.
Charters Towers, 16 to 18.
Cairns, 23, 24, 25.
Atherton, 30 and 31.

August.

Caboolture, 2 and 3.
Pine Rivers, 9 and 10.
Royal National, 19 to 24.

September

Imbil, 6 and 7.
Tully, 13 and 14.
Innisfail, 20 and 21.
Rocklea, 21.
Kenilworth, 28th.

Top Rot of Pineapples and Its Control.

By H. K. LEWCOCK, M.Sc., B.Sc.Agric., Assistant Plant Pathologist.

TOP rot is a disease of pineapple plants which is becoming increasingly prevalent in Queensland. At the present time the losses occasioned by this disease are exceeded only by those resulting from wilt.

As the name implies, top rot destroys the white, succulent, terminal portion of the stem as well as the bases of the young heart leaves which arise from it. The tough, outer leaves and the lower woody parts of the stem are rarely affected. In some localities in Queensland this disease is referred to as "wet rot," whilst in Hawaii it is known as "heart rot." The latter name is particularly appropriate.

Description of the Disease.

Top rot usually occurs in young plants before they have fruited, but older plants may sometimes be affected. Shortly after infection occurs, the central or heart leaves of diseased plants exhibit pronounced colour changes ranging from a drab olivaceous green to shades of red, but the outer leaves may retain their normal green colour and rigidity until the disease is well advanced. Affected leaves, being cut off from their water supply, dry out rapidly and curl backwards along their edges. When this occurs, they take on a characteristic smoky-brown appearance. In the final stages of the disease, the rotted tissue disintegrates and the leaves fall prostrate on to the ground.

A slight pull will detach the terminal crown of leaves from the stem of a top rot-affected plant, even before the foliage symptoms have become well-defined, and this is a useful method of identifying the disease in its initial stages. The bases of affected leaves display a foul-smelling, putty-coloured rotted area, which is sharply demarcated from the upper green parts of the leaves by a very distinct and characteristic brown margin. The apex of the stem exhibits a similar type of rot which, ordinarily, does not extend into the woody, fibrous tissue of the rootstock. This stem rot is also characterised by a well-defined brown margin.

Suckers sometimes shoot from the woody rootstocks of plants which have been affected with top rot. These new growths may remain healthy and ultimately produce fruit, but usually they succumb to the disease at an early stage in their development.

Cause of the Disease.

Top rot is an infectious disease caused by a fungus which invades the plant through fresh cuts or injuries, through decaying roots, or through the tender apical tissues of the stem. In Hawaii, it has been reported that several related fungi belonging to the genus *Phytophthora* are capable of causing top rot in pineapples, but only one of these, *Phytophthora cinnamonii*, has been found to be associated with the disease in Queensland. *Phytophthora cinnamonii* is also an active cause of pineapple wilt. In the latter disease the fungus attacks and destroys the roots, and it has been found that top rot may sometimes develop from such root infections should the rotting of the root tissues continue upwards into the stem. The initial sporadic top rot infections, which usually appear about mid-winter, may frequently be traced to diseased

roots. If these first-affected plants are not quickly removed, they may later become centres from which a widespread infection of other plants occurs at or above the ground level. Under favourable moisture and temperature conditions, fungus spores are liberated from the rot-affected leaf bases and stems and, during heavy rains, these spores are disseminated to healthy plants by the movements of surface water.

The causal fungus of top rot is able to survive in the soil for considerable periods of time, and since it is also an active parasite of pineapple roots the disease is likely to reappear indefinitely on land once it has been contaminated with the fungus.

Factors Influencing the Occurrence of the Disease.

Losses from top rot occur chiefly during the winter and spring months. Young plants up to twelve months old are most subject to attack, but mature plants which have fruited may also occasionally succumb to this disease.

The occurrence of top rot in a field of young pineapples may be restricted to isolated plants scattered here and there throughout the plantation, but it is more usual to find certain areas exhibiting a high degree of infection whilst the remainder of the plantation is practically free from the disease. A loss of from 50 to 60 per cent. has been noted over portions of affected plantations. The Ripley Queen pineapple appears to be more susceptible to top rot than the more widely-grown Smooth Cayenne variety, but this is possibly due to the fact that the former variety is grown almost exclusively in the neighbourhood of Brisbane on soil which is frequently both shallow and poorly drained.

The incidence of top rot disease and the extent to which it may develop is largely determined by environmental conditions. Within a given field these may vary considerably from year to year. In Queensland top rot causes serious losses only in seasons when the rainfall is exceptionally heavy. Even in wet years, however, epidemic outbreaks of the disease are restricted to low-lying, shallow, and inadequately-drained soils or to relatively flat land which is subject to flooding during heavy rains. Differences in topography explain why the disease has long been prevalent in some localities but quite unknown in others.

Plants propagated from tops or slips are more susceptible to the epidemic form of the disease than those grown from suckers. The loose, open structure of the first-named types of planting material renders their tender heart tissues especially subject to pollution by contaminated flood waters, and thus the chances of infection taking place are greatly enhanced.

Control Measures.

Although the causal fungus of top rot is also the organism chiefly responsible for the losses occasioned by pineapple wilt, different parts of the plant are involved in these two diseases, and somewhat different methods of control are required to combat them.

Top rot seldom causes serious trouble on sloping, well-drained land and, consequently, no special precautions are necessary in hilly districts except to dig up carefully and then destroy any affected plants as soon as they appear. If this is not done, the disease may spread downhill from the diseased plants over narrow fan-shaped areas. On relatively flat land, however, or in shallow, poorly drained soils, it is recommended

Plate 68.
Longitudinal section of Pineapple affected with Top Rot.

that the suckers or slips be planted on low ridges in order to ensure a quick run-off of surplus water from around the roots, and also to avoid the possibility of contaminated flood waters coming into contact with the young plants.

Objection has been taken to the ridge method of planting on the ground that by the time the plants are three or four years old they are so far out of the soil that the ratoon or sucker growths cannot root properly, but this can be obviated to a large extent by continually working the soil up towards the plants. However, whether the ridge method of planting is adopted or not, plantings on flat country should on no account be made in shallow trenches. When this is done, water collects in and flows along the trenches during wet weather, with the result that whole rows of plants may become infected with the top rot fungus. This is particularly likely to happen when a few scattered diseased plants are present in a plantation, as, under favourable conditions, these may become potent sources of infection. It is obvious, therefore, that plants affected with top rot should be carefully removed from the plantation as soon as they are detected, since further spread of the disease may be considerably checked in this way. Even when a new sucker growth appears from below the rotted region of the stem it is unwise to leave the rootstock in the ground, as the remains of the previously rotted portion may later serve to spread the disease to other plants.

In Hawaii immersion of suckers or slips in a fungicide prior to planting has recently been recommended as a preventive treatment against top rot when replanting land on which the disease has previously been in evidence. The fungicide used is a specially-prepared Bordeaux mixture consisting of 1 lb. of crystalline copper sulphate (bluestone "fines") and 1 lb. of fresh hydrated lime to every three gallons of water. Fresh burnt lime (quicklime) may be substituted for hydrated lime where the latter is not available, but only three-fourths of the quantity is required—viz., ¾ lb. of quicklime to each three gallons of fungicide. The procedure recommended by Mehrlich in Hawaii for preparing and using this Bordeaux mixture is as follows:—The bluestone is first dissolved by suspending it in cheesecloth in one-half the quantity of water required for the complete fungicide, using an open wooden cask or a well-tarred oil drum as the container. Shortly before the Bordeaux is to be used, the hydrated lime is thoroughly mixed with the remaining water in a separate container. While stirring the copper sulphate solution the lime suspension is poured into it. The mixture should be thoroughly stirred both before and during treatment of the suckers or slips. Before use, however, the freshly-prepared fungicide should be tested in the customary way with blue litmus paper or a clean, bright knife blade. Only vigorous suckers or slips which have been stripped about two weeks prior to planting should be selected for treatment with this Bordeaux dip. These should be wholly immersed in the freshly-prepared fungicide, preferably in the field where they are to be planted, and they may be planted either before or shortly after the fungicide has dried upon them.

Mehrlich reports that this Bordeaux mixture dip has given better control of top rot than larger quantities of the same or different fungicides applied in other ways. In repeated tests under conditions extremely favourable to the disease, an average control of 80 per cent. has been obtained from its use. When the fungicide is prepared

according to the procedure outlined in the preceding paragraph no injurious effects have been observed to result from its use, but on account of the cost and labour involved it is probable that it will be found economical to employ it only for treating planting material intended for old land on which outbreaks of top rot have occurred in previous plantings. On new land cultural precautions alone should give an adequate measure of control.

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The Common Bracken.

(*Pteridium aquilinum.*)

By C. T. WHITE, Government Botanist.

Description.—A coarse, robust fern with creeping underground stems often covering extensive areas of country. Fronds erect, mostly 2-3 feet high and 1-2 feet across, but varying considerably in size according to situation and locality. Spores borne on the under surface of the fern in long, narrow lines close to the margins of the lobes of the frond.

Distribution.—Bracken in one form or another is widely spread over both the temperate and tropical regions of the world. Many varieties of it have been described.

Botanical Name.—*Pteridium,* meaning similar to *Pteris,* a very large genus of ferns; *pteris* was the name applied by the ancient Greeks to ferns in general; *aquilinum,* from Latin *aquila,* an eagle, from the old English name of the plant—Eagle Fern.

Uses.—In Europe Bracken has been used from time immemorial for a multiplicity of purposes—the young roots cooked as greens, the rhizomes ground into a meal for adding to ordinary flour, the fronds as thatch for houses and bedding for animals, both stems and leaves for distilling a root beer with supposed tonic virtues, the ashes for the manufacture of soap and glass, the whole plant as a tan for dressing kid and chamois leathers, &c.

Poisonous Properties.—It has been definitely proved by feeding tests in England and elsewhere that the Common Bracken is poisonous to stock, though apparently large quantities of it have to be eaten before any ill-effects are noticed. Cattle affected by Bracken Fern generally show prominent gastric trouble accompanied by emaciation and a high temperature. In cases of reputed bracken-poisoning in Southern Queensland a feature recorded has been bleeding at the nostrils, and this condition is one recorded in feeding tests in England. Young stock seem to be more affected than old. In cases of bracken-poisoning in New South Wales, Seddon and McGrath record the principal features to be loss of condition, diarrhœa and dysentery, and death as a rule after a comparatively short period of illness, or less commonly only after two or three weeks. They further state that the Bracken is only indirectly the cause, the real trouble being due to a microbe which is responsible for the symptoms of fever, dysentery, and hæmorrhagic septicæmia. They state that the microbe associated with the disease is not capable of producing ill-effects in healthy stock, and that mortalities are really due to the Bracken, which lowers the resistance of the animal to the disease. They report that their investigations at the Glenfield Research Station have definitely shown the relationship of the two conditions, and that Bracken is to be regarded as a very harmful foodstuff.

Eradication.—In coastal Queensland Bracken is often a serious pest of pasture land. In very light, sandy soil the fronds with portion of the rhizome or underground stem can be pulled up. In ordinary pastures, however, this is not usually practicable, and the usual practice

Plate 69.—The Common Bracken.

is to knock down the fronds with a stick, experienced farmers stating this has more effect on the plant than mowing or cutting off with a sharp implement such as a fernhook or brushhook. Heavily pasturing the land, particularly with steers, who eat the young shoots and break down a lot of the fronds by camping on them, is said to work well in keeping the fern in check in larger areas.

Botanical Reference.—*Pteridium equilinum* (L.) Kuhn, v. Deck Reisen 3, Bot. 11, 1879; *Pteris aquilina* Linn. sp. 2, 1075, 1753.

Lameness in Pigs.

By K. S. McINTOSH, B.V.Sc., Government Veterinary Surgeon.

LAMENESS in pigs may be classified into four groups:—

1. **Rickets.**—This condition is due to insufficiency of mineral matter in the feed and lack of the essential vitamine which enables the animal to utilise same.

The hard supporting substance of the bones consists largely of calcium (lime) and phosphorus, and unless the animal receives an adequate supply of these materials its bones do not develop normally (*i.e.*, become hard and flinty) but become soft and spongy.

The effect of this bone weakness is most noticeable in the limb bones, as these carry the weight of the animal. The legs may become either "bowed" or "knock-kneed" and there is usually some enlargement at the joints. These enlargements are not very painful, but there is a tenderness of the joints and bones and this, together with the physical deformity, causes an irregular and disturbed gait.

If such an animal be killed and a postmortem examination held the bones may be easily pared with a knife, the ribs break like cardboard, and a row of enlargements is seen at the junctions of the ribs and their cartilages.

Calcium and phosphorus also assist in the formation of many other tissues such as blood and muscle, and for this reason affected pigs are often poor, weedy, and more prone to other troubles such as indigestion owing to impaired vitality.

The age at which pigs are most commonly affected is from the weaner to the porker stage. Brood sows are also liable to be affected since the formation of the young pigs or fœtuses and the subsequent drain through the secretion of milk demand large quantities of mineral matter which are supplied by the sow.

The prevention of rickets lies in proper feeding. Fortunately we have a cheap and effective mineral supplement in ground rock phosphate and an easily procurable supply of vitamine in green leaves. Lucerne is particularly recommended, as it is an excellent feed for pigs and contains a relatively high proportion of vitamines. Wherever ground is available an attempt should be made to grow lucerne. It has been found that pigs fed on a diet of skim milk and maize frequently develop rickets, but if greenstuff is fed daily, also 1 dessertspoonful of ground rock phosphate per pig per day, no such trouble is encountered. In addition, pigs will gain more rapidly in weight when the mineral and greenfeed supplement is used.

2. **Germ Invasion** of the joints and adjacent structures. Infection of pigs may take place at or shortly after birth via the navel cord, or later by the ingestion of contaminated feed, &c.

In early infections the trouble is usually severe and the course rapid, many of the young pigs dying within a week or so.

Later infections may affect the joints and adjoining structures, causing the formation of pus swelling and inflammation of the part with severe lameness. The knees and hocks are most commonly affected,

then the stifle and elbow joints. The part is very painful and there may be a discharge of pus from the swelling through one or more small openings.

In New South Wales another germ was found which attacked the ends of the bones just under the joint cartilage, and whilst the lameness and pain are very severe no very striking changes can be seen. If the bones of an affected joint are boiled and the cartilage stripped off, the joint surface of the bone (*i.e.*, under the cartilage) is found to be distinctly pitted. This form has also been found in Queensland.

The above germ diseases are associated with bad methods of housing, feeding, and hygiene. When pigs are affected it pays to get rid of them as soon as possible before they lose condition. In the case of suckers suffering from navel infection do not waste time in treatment, but concentrate on preventing trouble in subsequent litters. Allow the sow to farrow under scruplously clean conditions and this trouble will disappear.

Throughout its life the pig should be kept under condlitions of strict cleanliness. The animal should have adequate shelter from sun, rain, wind (particularly draughts), and should not be kept in damp, muddy sties. Mud wallows are undesirable from every standpoint.

Feed troughs should be made of iron or concrete and kept clean. It is impossible to clean a wooden trough thoroughly and the small extra expense incurred in purchasing suitable troughs will be repaid later by healthier pigs. Clean, fresh food and clean containers and utensils are of paramount importance. Many farmers believe in feeding "sour" skim milk, but, unfortunately for the pigs, this means not pure sour milk as we see in a cheese factory, for example, but putrid or decomposed milk. It is usually held before feeding in a cask or vat crusted with the accumulation of months—perhaps years—of decomposing material, containing countless millions of putrefying and perhaps disease germs.

Is it any wonder that when such is given to young pigs lameness, digestive and other troubles occur?

3. **Suppurative Otitis.**—Strictly this is not a lameness but a loss of sense of equilibrium and direction caused by the formation of pus in one or both ears. In each ear there is a delicate system of "spirit levels" which gives the pigs their sense of direction. When these are destroyed by pus formation the pig moves in circles, usually with the affected ear down towards the ground.

The ear infection is usually an extension of some catarrhal condition of the throat, but the germs may possibly gain entrance via the outer ear. Many people believe that the condition is caused by pouring milk into the pig's ears during feeding, but probably this is not a common cause.

For prevention strict attention should be paid to housing, feeding, cleanliness, and general management as outlined above.

4. **Pig "paralysis."**—This obscure condition has been investigated by a number of workers—notably W. A. C. Frazer, at Glenfield Research Station, New South Wales.

The symptoms are loss of co-ordination of the muscles of the hind limbs. Crossing or plaiting of the hind legs and knuckling over on the

fetlocks are early symptoms. Later the animal is totally unable to support its hindquarters and progresses by means of the front legs. In time the front legs may also be affected. The voice changes to a high-pitched "falsetto monotone."

Whilst the animals can get sufficient feed and drag themselves about they frequently retain their condition which is usually good, but if the forelegs are affected they commence to lose weight.

The cause and treatment of this complaint is at present unknown, and the most economical method is to sell the affected pigs to the butcher before the trouble is too far advanced.

5. **Miscellaneous.**—Under this heading we may include wounds, fractures, tuberculosis of bones and spinal column, inflammation and growths of the brain and spinal cord, and parturient paraplegia of sows. The last-named is associated with the act of farrowing. Just before or just after the act the sow suddenly loses the use of her legs. Good nursing and laxative diet are the main methods of treatment.

Kidney worm is often thought to be the cause of staggery gait, but the latest work has shown this to be extremely rare. Occasionally a worm will "wander" into the spinal canal and cause staggering, but if situated in the normal position, *i.e.*, kidney fat, such is not the case.

Any disease such as pneumonia, severe enteritis, infestation by parasites, &c., which causes general disturbance of the body functions, may cause muscular inco-ordination or staggers, and here, of course, treatment lies in eradicating the primary trouble.

This article has touched on several complaints of pigs which are not true lameness but which cause disturbance of gait, but as these are often confused with true lameness they should be taken into consideration by the farmer if locomotory troubles should arise.

In conclusion remember that—

Strict cleanliness of sties and feeding utensils,

Proper feeding,

Adequate shelter and housing,

Protection against internal and external parasites (see advisory leaflet No. 2),

are the fundamentals of profitable and successful pig raising.

TO MAKE WHITE LEATHER.

Soak the hide for forty-eight hours in clean cold water. For fleshing and unhairing, make up ½ lb. unslaked lime and ¼ lb. salt to each gallon of water required to completely immerse the hide, and soak for twenty-four hours, when most of the hair and flesh can be scraped off. Make up a second soak, using lime only. Then the hide can be scraped free of every particle of hair and flesh. A further soaking in clean cold water will then be necessary. For a first curing soak, use 4 oz. alum to each gallon of water, and for the second, 6 oz. About two days in each will be sufficient. Before the hide is taken out, cut it and see if there still remains a streak of colour inside. The curing must go on until the hide is white right through. Allow the hide to partially dry in a dark place away from the wind, and then rub in as much fat, tallow, or melted paraffin wax as it will hold.

Litter Recording of Pigs.

By L. A. DOWNEY, Instructor in Pig Raising.

THE value of litter recording has been stressed by this Department on numerous occasions, and at least one pig breeder has taken up the work in earnest.

In the August issue (1934) of the "Queensland Agricultural Journal" there appeared a report of a litter of Large White pigs owned by Mr. A. G. Stewart, of Strathmore Stud, Cedar Pocket, via Gympie. This litter, from the sow "Highfield Jewel 4th," was reared by hand owing to a mishap to the sow; it consisted of nine pigs, which weighed 459 lb., or an average of 51 lb. when eight weeks old.

The next litter tested at Strathmore Stud was from the Large White sow "Norfolk Bonetta 4th." This litter consisted of eight pigs, which averaged 48½ lb., a total litter weight of 388 lb. at eight weeks old, and as this litter was exhibited at Brisbane Show the rate of growth was probably retarded somewhat owing to transport and changed environment.

The last litter to complete its test at Mr. Stewart's stud is from the Large White sow "Highfield Jewel 4th," and sired by "Gatton Junker." Thirteen live pigs were born on 9th November, 1934, one pig died on the following day and another was taken from the sow on that day, leaving her with eleven pigs.

The birth date and final weights of this litter were checked by officers of the Department and are shown as follows:—

Tattoo Number.	Boars.							Sows.			
	65	66	67	68	69	70	71	72	73	74	75
Weight at birth ..	3	3	3	3	3	2½	3	3½	3½	2	3
,, ,, 1 week	5½	7	6½	6½	6½	5½	6	7½	7½	3½	5½
,, ,, 2 ,,	10	12	11½	11½	11½	7	11	12½	12	7	9
,, ,, 3 ,,	15	16½	16	16	15½	8½	16	17	16	10	11½
,, ,, 4 ,,	18	19	18	20	19	10	17	19	19	11	13
,, ,, 5 ,,	24	23	22	23	25	14	23	22	26	14	16
,, ,, 6 ,,	30	34	30	80	34	20	29	27	33	19	21
,, ,, 7 ,,	36	38	35	38	39	28	35	34	40	27	30
,, ,, 8 ,,	43	43	41	46	46	35	42	40	47	34	36

Total at 8 weeks .. .. 453 lb.

Average at 8 weeks .. .. 41·1 lb.

The Identification of Pigs.

By E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising and Supervisor of Grading.

AS Regulations under "*The Queensland Pig Industry Act of* 1933" make identification of all pigs offered for sale or disposal compulsory, farmers, agents, dealers, and others interested in the sale and purchase of pigs should be conversant with the various systems of identification of this class of animal and of their application in accordance with the Act and Regulations.

For instance, Regulation 6 reads as follows:—

"Every pig offered for sale, barter, or exchange shall be branded by the vendor with a body tattoo or other approved method of branding. In the case of sucker, weaner, store, or other pigs not intended for immediate slaughter, ear-tattooing, or ear-marking shall be an approved method of branding. Such branding shall take place within seven days prior to such sale, barter, or exchange."

REGISTRATION OF BRANDS.

Departmental stock inspectors stationed in various centres throughout the State are in a position to advise farmers as to the advantages or otherwise of registration of earmarks for pigs, and their services should be requisitioned by all farmers who are in doubt on any of these matters, especially as it is necessary in effecting registration to have particulars of any registered marks used by neighbouring farmers.

There are five or more systems of identification of pigs in regular use in this State, each of which has its own particular advantage. These systems are ordinarily defined as follows:—

Firebranding;

Body-tattooing;

Earmarking (inclusive of use of ear tags) and ear buttons;

Ear-tattooing;

Paint and hair-clip marking (inclusive of cutting of hair on tail—i.e., bang-tail).

MARKING SYSTEMS.

Firebranding.

For marking live pigs this system of identification has been in use throughout the world for many years and is used frequently by farmers here, especially by those who are not conversant with or in favour of other systems.

It may be said that while there are many objections to identifying pigs by the use of a redhot iron brand, the system has its place and doubtless will continue to be used until a more efficient system of identification of the live animal is introduced. Efficient firebranding has the advantage that it is a method of marking live animals as well as carcasses; in itself the system is an effective one if carefully applied with a suitable brand that is not overheated, or held too long, or pressed too deeply on the body, as it results in a reasonably clear and legible skin and body mark. It is the abuse of such a system which brings it into discredit, and firebranding certainly is abused, as many otherwise suitable carcasses have to be degraded and many rejected by reason of excessive and cruel firebranding. Suitable iron and copper firebrands may be purchased at from 12s. 6d. to 15s. each, while there has also recently been introduced a self-heating branding iron for the firebranding of other classes of stock, such irons working on the principle of petrol-heated household irons and other electric heating appliances. It is hoped that eventually this old-time system of identification will be replaced by a more efficient and less objectionable method, but such a method of live-pig body marking has not yet been developed sufficiently for use on pigs, though acid, steam, and other types of brands have been used and are still undergoing research in this and other States.

For purpose of ascertaining the views of prominent men associated with the pork and bacon trades, circulars were recently forwarded by the Department to a number of bacon curers, pork exporters, and stock agents in this State asking them to express their views on firebranding. Practically all indicated a general desire for a better system than the use of the firebrand, especially for use in marking animals whose carcasses are intended for the export trade.

Firebranding has one special advantage in that is is used to identify live pigs belonging to various owners where such pigs are forwarded together as mixed consignments to auction sales and factories, consignments in which body-tattooing of carcasses would not be sufficient. In some instances, however, earmarking and ear-tattooing of such pigs could be used to just as much advantage and with less objection than firebrands.

Where properly applied, firebrands on pigs will be legible for two months or more, but after that period they gradually disappear and are difficult to decipher either on the live animal or on the carcass, and thus they become unreliable and objectionable.

Body Tattoo-marking.

This is an efficient and the most practical system of marking in the identification of pork and bacon pig carcasses, and during recent years has been almost universally adopted by bacon curers and pork exporters in Queensland. Correct identification of carcasses is an essential in the treatment of pigs by factories, and more particularly where payment is made on a basis of official grading; hence the necessity for a reliable method such as this.

Additionally, it is necessary to identify owners of pig carcasses in order that refunds or non-payments may be correctly adjusted where, on slaughter, carcasses or parts thereof are condemned by Government inspectors as unfit for the use of man. Body-tattooing is particularly valuable in thus identifying ownership, and also in providing necessary information in tracing diseased animals to the farm, saleyards, or other place of origin.

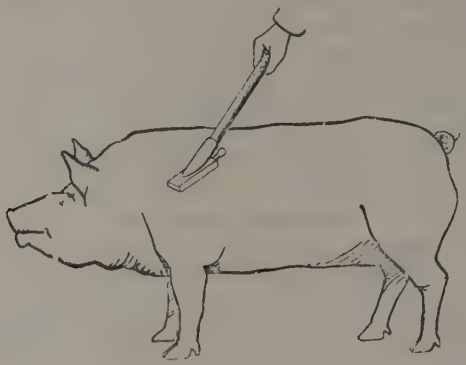

Plate 70.

The Austral pig-body tattoo showing position favoured for the identification mark on the carcass. This instrument has needles of the gramophone type, and is supplied by manufacturers complete with nickel-plated headpiece and wooden handle. The numerals are mounted in polished aluminium blocks, the positions being altered in a few seconds by means of the adjusting screw. Spare numerals and dummy blocks may be ordered; tattoo ink is supplied in quantities as required.

[*Illustration by courtesy of Taylor and Elliotts Ltd., Brisbane.*

The body-tattoo instrument (*see* Plates 70 and 71) is a simple, comparatively inexpensive device for bodymarking pigs. The hammer head or that portion in which the letters or numerals are inserted is made of aluminium or nickel-plated steel; the tattoo needles are of similar type to gramophone needles, either pencil-pointed, grooved, or otherwise, according to style of instrument used. There is an adjustable screw to fix letter blocks in position, the handle being of hardwood or other material; the headpiece of the body tattoo is the heaviest portion of the instrument, this to provide weight and thus provide for better results in marking. The letters, symbols, and/or numerals used would, of course, vary in each case, the owner's brand or symbol always being used and a different numeral inserted for each lot of pigs marked. By the use of four or a complete set of blocks, a considerable number of combinations may be arranged for, thus enabling large numbers of pigs to be marked without duplication. A tattoo mark properly applied is sufficiently permanent to enable its use to be extended and to be included among the systems recommended where identification is compulsory or necessary.

This method of identification has been given extensive trial and has given general satisfaction, but the measure of efficiency is entirely dependent upon the care used in handling the instrument and the provision of a sufficient supply of suitable ink or paste. The quality of

the paste or ink used is most important. Of several preparations that have been subjected to experiment in Queensland, four stand out as being superior to all others.

Indian marking ink (blue or black).—This pigment, while slightly more expensive than the others, is probably the most efficient and adaptable, and in actual use is very readily applied.

"Zebra" stove polish in paste form has given excellent results; so also has "Zebra" liquid stove polish sold under the trade name of "Zebo."

Sherwin-Williams' black paint in oil has been used extensively by the proprietary bacon factories with satisfactory results, and is also recommended.

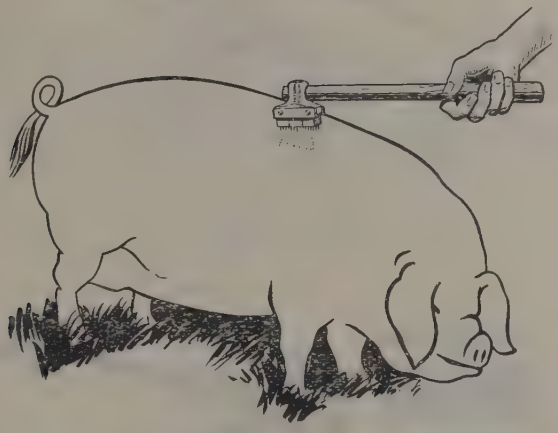

Plate 71.

Sold under the trade name of the "Two-Way Tattoo Pigmarker," this instrument is constructed to withstand hard and constant use. The headpiece is made of aluminium with steel-pointed needles, the wooden handle being adjustable for use in two positions—one permitting use in hammer fashion, the other with spear-thrust action. The illustration portrays a favourite position for branding.

[*Illustration by courtesy of Smiths, Stamp Makers, Brisbane.*

These preparations are readily procurable in country centres and are relatively so inexpensive there is no need to use any other. If not obtainable locally, they may be obtained from city firms, price varying from 6d. per tin of stove polish to 3s. 6d. per bottle of blue or black Indian ink.

In actual use it is necessary to have a soft pad or other container to carry the paste, paint, or ink, and to hold this in the hand or affix it firmly in a convenient position out of reach of the animals. When all is ready, the tattoo needles are dipped in the paste or ink, the needles being well covered; the pig is then struck firmly with the marker (*see* Plates 70 and 71). The best position on the body for the tattoo mark is on the shoulder just off the top and slightly below top of neck. A sharp blow is required in order that the needles will penetrate the skin, and after each pig is marked the needles should be again covered with paste or ink. Actually, although the needles are sharp and the

blow heavy, the pig does not experience much pain and apparently does not suffer injury, for it is very rare that even a slight bruise is noticeable after slaughter if tattooing is done properly.

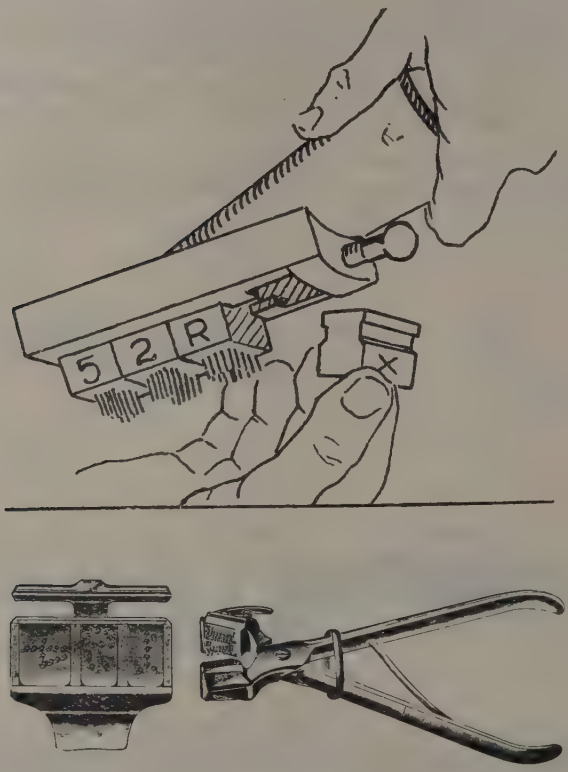

Plate 72.

Illustrates method of inserting numerals or letters in body-tattoo instrument; also shows metal screw for adjusting position of blocks.

The lower figure illustrates the ear-tattooing device.

[*Illustration by courtesy of Taylor and Elliotts Ltd., Brisbane.*

It would be well here to again stress that this system of body-tattooing is not at present intended or recommended as a means of identification of live pigs—not even of white-skinned pigs. Its value lies in the legibility of the tattoo mark on the carcass; the ease with which the tattoo mark may be read; and the fact that its application does not result in disfiguration or any other objectionable feature. Again we stress that efficiency of tattooing as a means of identification is dependent upon—

(1) The efficient use of the tattooing instrument;

(2) The use of an instrument of a reliable type with strong, sharp needles;

(3) Taking time to do the job properly; and

(4) The use of a reliable brand of ink, paste, or paint.

When Marking should be Done.

As the Regulations under the Queensland Pig Industry Act throw the responsibility of identification on the vendor, whether he be farmer, agent, dealer, or manufacturer's representative, it is essential the pigs be identified before sale or delivery; thus the pigs should be marked on the farm prior to despatch or be identified by the agent (1) when being weighed over the scales at the railway siding or loading-place, (2) when being penned for sale, or (3) when received for consignment direct to factories. The Regulations also make it compulsory for those persons handling pigs to keep records. Section 11 of the Act provides for this as follows:—

"Every agent, auctioneer, dealer, factory, or butcher shall keep a record in respect to every transaction in pigs with which he is concerned.

"Such record shall include the date, the number, description, and distinguishing marks of such pigs, the name and address of the vendor, and the name and address of the purchaser, and such other particulars as may be prescribed.

"Such information shall be made available to an inspector upon request by the inspector to the auctioneer, agent, or dealer, as the case may be."

Plate 73.

Showing handle of two-way tattoo in position for use where pigs are crated or in a position unsuited for use of the instrument as illustrated.

Illustration by courtesy of Smiths, Stamp Makers, Brisbane.

Where Marks should be Placed.

In all systems of identification it is essential that while being marked the pigs be confined in a small pen or race, or that they be marked in the vehicle in which they are to be transported (if such vehicle is convenient for the purpose). Where there is a lack of conveniences and the person identifying the pigs is inexperienced, it would be possible, in order to avoid duplication of tattoos, to attach a small pad soaked in ink or paste to that portion of the hammer head of instrument not fully occupied by letters or numerals, this merely to leave a paint mark on hair of the pigs as they are marked, for on black pigs in particular, when care is not taken, a pig may be marked twice in the same position unless some precaution is taken.

Fig. 1.

Fig. 2.

PLATE 74.

Illustrating style of identification mark resultant from use of the body tattoo.

[Illustration by courtesy of Smiths, Stamp Makers, Brisbane.

After the pigs have been slaughtered and dehaired the tattoo letters or numerals show clearly in the form of black dots (*see* Plate 74, fig. 2), such tattoo marks being legible even if the pigs had been tattooed several weeks beforehand. In body-marking of pigs with tattoos there is no necessity for any preparatory treatment of area on which tattoo is to be applied, except that the area should be clean and free from accumulations of mud. The instrument should be kept in a clean condition, and sufficient ink or paste must be used, otherwise results will be unsatisfactory. Farmers not conversant with this method should attend at pig sales where tattooing is carried out.

Regarding the cost of body tattoos, a complete set, including hammer head, handle, stamp pad, and sufficient paste or ink for marking 100 pigs, will vary in price from £1 to 25s., according to number of letters or numerals and quantity of ink or paste supplied. Names and addresses of manufacturers may be obtained on application to the Department of Agriculture and Stock at any time. If carefully handled, the one set of letters and numerals should be satisfactory for many years.

EARMARKING.

The branding or marking of individual animals in a herd is a matter of the greatest importance to the farmer, more particularly where the animals graze and roam over large areas and mix together

Plate 75.

Plate 76.

Showing operator using the body-tattoo instrument; note position approved for marking pigs.

one with the other, perhaps on properties adjacent to those on which other animals are kept.

No system of identification is considered perfect, but for identification of live animals both earmarking and ear-tattooing are practical and readily applied. It is of even greater importance that the brand or earmark be recorded in a suitable record book at the time that marking is done, otherwise the reliability of any system is weakened.

The earliest age at which an identification mark becomes necessary in pig-breeding is between one and two months of age. Where sows and litters have individual pens, two months of age or when the young pigs are weaned will suffice, or where castration of male pigs is carried out at six weeks earmarking could then be done. Every litter of pigs should be marked and correct records kept and recorded in the sow's farrowing and stock sales record book. Earmarking is probably the commonest and the most satisfactory method of marking for stud stock, but it has the disadvantage that when pigs fight or tear their ears on wire or barbed-wire fences, or where the ears are damaged in dehairing machines at the factory, this identification mark becomes somewhat unreliable. The operation of earmarking is performed with the aid of earmarking pliers, of which there are numerous designs. Earmarkers are known under trade names of Crown, Diamond, Fork, Spear, Pitchfork, Swallowtail, Thistle, Club, &c., all of which names are derived from the shape of mark made by the pliers. Allotment of earmarks and of position of marks on the ear is provided for under the Brands Act.

Pigs of all ages can be earmarked, but, as stated, it is preferable to mark while very young. Stud pigs should always be marked so that their breeding and ownership can readily be determined. Newly purchased pigs should be marked immediately they are brought into a stud to avoid confusion if they should become mixed with other stock or break fences and escape.

Earmarks are placed in different parts of the ear in accordance with position allotted when the earmark is registered. All the members of a litter should be marked with the same mark and recorded when sold or reserved for use on the farm, and all pigs sold, exchanged, or transferred should be marked with the registered earmark.

The cost of registration of an earmark for pigs under the Queensland Brands Act is 10s. Earmarking pliers for use in marking pigs cost between £1 and 30s., the price varying with design and size of instrument used. Earmarks should be registered with the Department of Agriculture and Stock, Brisbane; information on this matter can always be obtained from stock and dairy inspectors who are also inspectors under the Pig Industry Act.

In Queensland it is not compulsory to register brands or earmarks for pigs (although it is compulsory to identify the animals before sale), but if a registered earmark is used it must be placed in the position allotted to the applicant, and no other mark or brand is permitted on the same ear. Cuts in the ear representing sheep earmarks (which are used for identifying pigs) must be placed in the off or right ear of male pigs and in the near or left ear of female pigs in the position for which registration has been effected.

The earmarks must be read around each ear from the head, commencing at the front or top of the ear. All earmarks, of whatever kind, used in marking under the Brands Act must be made with pliers.

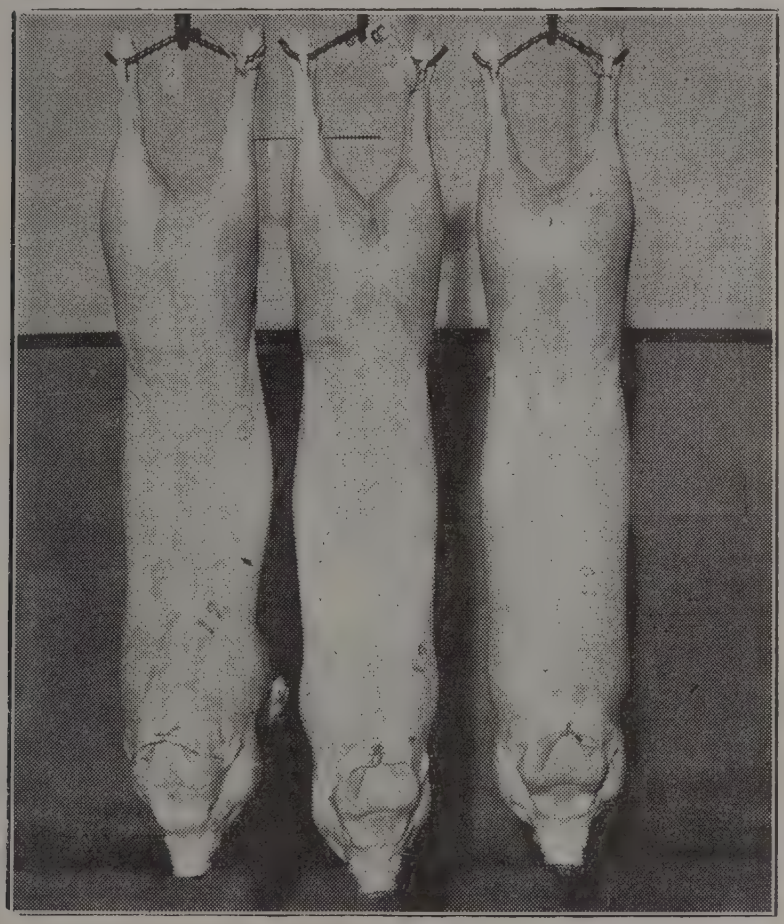

Plate 77.

Illustrating neat, attractive body-tattoo marks appearing on prize-winning porkers at the Royal Show, Toowoomba.

A sheep (or swine) earmark is defined officially as any registered mark or cut upon the ear of sheep or upon any goats or swine. A distinctive mark may also be used in marking the ears, and such marks may be registered. A distinctive mark is defined as any mark or cut, other than a sheep mark, which an owner is empowered to make upon the ear of sheep, goats, or swine to denote their age or class and whether registered or unregistered. Distinctive marks shall be made on the near or left ear of male pigs and on the off or right ear of female pigs. No provision is made covering the shape, design, or size of distinctive

marks, and any owner may use any number of distinctive marks to denote the age or class of his pigs, but such distinctive marks shall not be made on the same ear as the registered sheep earmark. There is no charge for registration of a distinctive mark, but a registered earmark is definite legal proof of ownership in the eyes of the law in case of stealing, whereas a distinctive mark carries no such advantage. The advantage of a distinctive mark, registered or unregistered, is that as an earmark it can be used to supplement a registered earmark being used on the opposite ear to that on which the latter mark is placed; thus such marks can be used in case an animal changes ownership several times during its life.

Care should be taken in using ear pliers in marking pigs—first, to see that the pliers themselves have been properly cleansed by being washed in a disinfectant solution; secondly, to see that the ear has similarly been cleansed, and also to avoid cutting into the larger blood-vessels near the edge of and towards the back of the ear. It is wise also to avoid cutting too close to the tip of the ear, especially in stud pigs, as the shape and carriage of the ears may be disfigured. In young pigs a small cut only is necessary. A word of caution is necessary *re* earmarking pigs, for at times sow pigs, in particular, become savage and may tear the ears of other pigs—young pigs particularly—and in this way may disfigure the ears. Such sows should be separated from the herd and be finished for slaughter, as they cause unnecessary loss, damage, and confusion. It is wise also to confer with the manager of the bacon factory or pork export works before deciding on an earmark so as to avoid duplication of marks.

Stud pig breeders in particular should register an earmark if an ear tattoo has not already been registered with the Stud Pig Breeders' Society; the latter being a private organisation, registration with them would not, of course, be officially recognised in a law suit, although such tattoo-marking is not objected to by the Department. When breeding sows are being marked, the mark should be recorded with the pedigree or record of purchase or birth. Additional particulars as to age, colour, any peculiar markings, &c., should be recorded at the same time to assist in identification if necessary.

If any doubt exists, farmers should immediately communicate with the Department, when suitable advice will be promptly despatched.

Ear Tags or Buttons.

The use of ear tags or buttons on stud animals when being transported by road or rail or shipped from place to place is to avoid risk of their being lost in transit, misdelivered, or miscarried. The tags, which are made of aluminium, may be initialled on one side with name, initials, or symbol of owner, and be numbered on the other. The principal objection to the use of ear tags is that they may be lost or, in the case of theft, may be replaced by another of the same type but with different lettering. All tags are subject to being pulled or torn out or to be crushed, mutilated, or disfigured to an extent as to be almost unreliable as a means of identification. If not properly inserted, the ear tag may disfigure the ear, and may even occasion a festering wound

around the tag hole, this especially so when the hole into which the tag is placed is too small or is jagged or when an unclean pair of pliers or unclean tags or buttons are used. The method of applying the ear tag by use of combination pliers is that one portion of the instrument is used to punch a hole in the ear into which the tag fits; the other portion of the pliers is to seal the tag to prevent loss. Combination pliers for use in punching holes for and for sealing ear tags are priced at about £1. Ear tags are sold at from 12s. 6d. to 15s. per 100, according to design, initials, &c. There is no provision in Queensland for registration of ear tags or buttons.

Ear-tattooing.

Members of the Australian Stud Pig Breeders' Society who breed Large or Middle White pigs are compelled by that organisation to use the ear tattoo for identification of their stud pigs, this method having proved to be sufficiently reliable for that purpose in white-skinned breeds. As with body-tattooing, the secret of success lies in careful application of the tattoo marks.

Tattooing has the distinct advantage that it is practically indelible; it only suffers by the inefficiency of the person using the instrument, or by the ears being torn or disfigured. In the case of stud pigs, it may be necessary to retattoo the ears as required if the mark becomes too faint. Care must be taken in tattooing the ears to see that both the ear and the instrument are perfectly clean before the operation is performed, otherwise septic troubles may result and a fibrous wart growth set up around the mark. Next to cleanliness, it is important that the needle blocks be firmly placed in the jaw of the pliers, as the animal may pull back suddenly when pressure is applied. The area to be punctured should first be cleansed by wiping over with a cloth soaked in methylated spirits (this removes grease); then the marking ink or paste should be rubbed on, and, after applying the tattoos, again rub in the ink or paste into the perforations made by the needles. Where pigs are to be tattooed with the owner's initials and a stud number also, one mark should be placed in each ear. The year in which the animal was born could also be placed in the form of a letter; thus in pigs the right ear could carry the owner's initials, and the left ear would show the year symbol and number, thus: A 365—i.e., pig born in 1934, number 365. In animals with a very heavy coat of hair on the ears it may simplify marking to first clip off the hair and then clean and apply the mark.

The Secretary (Mr. A. J. Tanner) of the Aberdeen Angus Herd Book Society of Australia states that in ear-tattooing of cattle of this black-haired breed blue Indian ink is used. Provided the veins in the ear are not punctured and that ample ink is used, good results may be expected. Mr. Tanner says the chief factor in using a tattoo is to thoroughly clean the ear before making a puncture and to rub the ink well in after using the pliers. Clean the ear with methylated spirits and use a good brand of blue Indian ink.

Tattooing marks properly applied cannot easily be removed, excision of the marked tissue being necessary to ensure complete removal.

Tattooing consists in "planting" black or coloured insoluble and non-absorbable matter under the skin so that the pigment becomes held or occluded permanently within the skin. Punctures of the skin are first made and the pigment introduced into the punctures. The puncturing presents no difficulty where suitable instruments are used, these latter being simple in design and construction. It is essential to stress the necessity for quick and efficient work in tattooing and the use and application of reliable brands of ink or paste, these latter having as their base carbon, lamp-black, and other indelible materials in solution or otherwise.

Ear-tattooing instruments complete with letters, numerals, ink, or paste retail at between 30s. and £2 2s., and may be secured from veterinary instrument manufacturers. The smaller size manufactured are best suited for marking young pigs.

Hair-clip Marking.

Marking pigs by means of clipping away the hair on any particular portion of the body is at best merely a temporary sale mark; so also is paint-marking and cutting of hair on tail (referred to as bang-tail). Paint-marks are useful once pigs are penned at an auction sale in order to differentiate between the animals and for reference purposes in sale of the stock, but they cannot be regarded as an approved method of branding under the Pig Industry Act. Both systems are useful in the hands of honest people, but a very strong objection to their use lies in the fact that an unscrupulous person could readily disfigure the mark and thus cause confusion and annoyance.

The objective of the Regulations is to pave the way for reliable methods of identification; hence as paint-marks, hair-clipping, and banging tails are not reliable as a permanent method of identification, they cannot be recommended. They would not be accepted as distinctive marks under the Brands Act, but if pigs are so marked at sale time the auctioneer should keep a strict record of such as provided for in section 11, referred to on page 161.

IDENTIFICATION OF GRADED CARCASSES

The Queensland Pig Industry Act provides for identification of all carcasses with grade stamps of a specified shape and size and of different colours according to how such carcasses are graded; such grade marks apply to all pork and bacon pig carcasses graded for sale within the Commonwealth. Grade stamp tags are attached to all carcasses intended for export as provided for under the *Commerce (Trade Descriptions) Acts,* 1905 *to* 1930.

Full particulars regarding these marks may be obtained upon application, in the case of the former, from the Department of Agriculture and Stock, William street, Brisbane, and for the export trade from the Chief Veterinary Officer, Department of Commerce, Q.T.C. Buildings, Petrie Bight, Brisbane.

The marking applied to bacon pig and pork pig carcasses for export consists of the word "Empire" in block letters, stamped on the hind leg, loin, fore-end (on shoulder), and hand and spring (foreleg).

Summarising these notes on identification, it may be said that it is advantageous in the interests of all concerned that all live pigs be branded by the vendor prior to disposal of the animals. It is essential that whatever mark is used it be used efficiently so that the animals are clearly and evenly branded. The next most important step is to advise the agent, dealer, buyer, or factory manager of the exact number, age, and condition of pigs, the marks given to each animal, and any other description that may be necessary to facilitate identification, and to be sure that the person concerned receives this information in ample time beforehand to enable identification to be carried out expeditiously on arrival of the animals.

POINTS IN PURCHASING STORE PIGS.

The following suggestions are offered to those who intend purchasing, or who regularly make a practice of purchasing, store pigs will not be out of place, seeing that a number of instances have been recorded within recent months in which unsatisfactory results have followed the purchases and money has been lost in the transactions. It is suggested that inexperienced persons who set out to purchase pigs for finishing for market should endeavour, wherever possible, to secure pigs not less than fourteen or sixteen weeks old, for it is disastrous buying pigs six weeks old or too young for weaning and expecting them to make progress or to prove satisfactory and economical, especially as these very young unweaned pigs often cost more at auction than those carrying more size and age. There is a wise old saying, "Never buy a pig in a poke," which literally means never buy a pig of whose breeding or development you know nothing. Fortunately, under the conditions on which pigs are offered for sale at public auction in this State, the buyer's name and postal address must be announced by the auctioneer before the pigs are offered for sale, but, though this is a valuable safeguard against the distribution of disease-carrying stock, it is not everything, and the buyers should certainly know something of the conditions under which the pigs intended to be offered for sale have been developed, the foods used in their production, the breeding, age, and any other information available. The purchase of store pigs from breeders with a well-known good reputation is usually a safe proposition, and it would be preferable to purchase only from well-known breeders if success is expected in the efforts to eradicate and/or trace disease to its source of origin. Lice, worms, and other parasites that infest the pigs are readily conveyed from one animal to another, and there is some evidence that they are responsible for the spread of disease.

When selecting pigs from a litter, secure the strongest and best; they will repay the extra cost of two or three shillings per head and prove to be good buying; the same may be said of purchasing stock that are already making good progress. Never buy pigs manifestly unhealthy and with abscess formation, ruptures, piles, open or suppurating wounds. It is wise, where possible, to have the stock or dairy inspector make an inspection of the pigs it is intended to purchase before the sale commences or the deal is completed, in order to have an additional safeguard. It is wise to avoid purchasing pigs which are in poor, emaciated condition and/or are stunted in growth and which give evidence of unthriftiness. Avoid purchasing where the pigs are crowded together in a small and possibly a badly lighted pen.—E. J. Shelton, Senior Instructor in Pig Raising.

Some Notes on Silage

WITH SPECIAL REFERENCE TO STACKS.

By H. C. QUODLING.

SILAGE stacks suffer deterioration if an attempt is made to hold them over from season to season. Best results are obtained by building them at the latter end of Summer, in the flush season, and using the fodder in the Winter or Early Spring.

It is evident that the dairymen and sheep farmers of our agricultural districts will never come into their own until their stock can be satisfactorily carried through the winters and over any dry spells which may occur.

Increased land values, and a general all-round rise in the cost of living and, similarly, in that of production, may be cited as reasons for keeping stock in condition and in a state of efficient productivity consistent with ruling conditions.

Cultivated crops and artificial pastures are doing much in effect, but seasonable shortcomings can only be met by looking to the contents of the barn for dry feed, and to the silo or stack; in this latter instance is to be found a palatable, ready-to-hand form of succulent fodder, which should be provided on every farm where live stock are kept for profit. Many arguments may be advanced in favour of silage, but it is felt these are not required where practical thinking men are concerned, whose chief inquiry is for reasons to prove to their intelligence that, by adopting certain methods of conserving fodder, they are to get a *quid pro quo* for their outlay, be it in labour or in kind.

Queensland's rich soils and generous summer rainfall are responsible for crop growths not attainable in the more temperate parts of the Commonwealth; and when such tangible results are to be so easily secured from Nature's garden, it is certain that a stockowner's desiderata in the matter of a supply of the right class of fodder will be readily attained by an extension of the self-help methods common to all who have to wrest a living from the land.

Inquiries through the medium of the Department on silo construction and its attendant features are sufficiently numerous to indicate that interest has been aroused in the subject of fodder conservation.

It is not proposed here to dilate on the merits of different silos or advocate possibly out-of-reach methods likely to act as a deterrent on account of an initial outlay of capital, but rather to deal only with a section of the subject with simple and economic features designed to meet local and existing conditions.

A number of silage demonstrations have been carried out by Departmental officers, and, although evidence in a general sense is not wanting to show the possibilities of fodder conservation, it is more fitting that the words of those farmers who have followed out the methods advocated may be made known to others who contemplate erecting silos or stacks.

PLATE 78.

Sledge cutter at work in an immature crop, showing manner in which stalks are laid down by means of guide rod.

Extracts from their manuscripts are as follows:—

"The stacking of maize was finished on Saturday, 3rd May. All are well pleased with the way the lever worked. It was rigged up so that the bundles were slung right over the side into the middle of the stack, and the earth for weighting (6 tons) was put up in the same way. We started feeding the silage to the cows straight away, and they took to it greedily, and are showing an increase already, so we are reaping the benefit of stored fodder."

"The ensilage is very good, and the cows would tear the stack of maize down to get at it."

"I think the method of stacking all that can be desired—that is, when one cannot afford to build a silo. It opens up splendidly, in my opinion, with very little waste, and stock eat it readily, notwithstanding that we had to cut the crop (maize and sorghum) on the green side, on account of being afraid of frost. The cows chase the dray as soon as they see it, and milk well on the fodder."

"It has been the means of storing from 100 to 160 tons of silage (sorghum and maize) which might otherwise have been spoilt."

"In 7 weeks after stacking, I commenced to use the silage, and came to the conclusion, in a very short time, that I had a valuable asset from a feeding point of view. I fed in boxes at the rate of 40 lb. per diem per cow, and cows which had been in milk from 4 to 8 months increased their flow fully 50 per cent. Cows which have newly freshened keep up their normal first flow unceasingly, and that during winter. It is better to feed after milking than before, and I am at present obtaining an A1 grade from the factory for my cream. . . . am well satisfied with the experiment, and have come down to the bed-rock conclusion that, as soon as funds will permit, I will erect a silo, as, after some years' experience, it has been found that one cannot 'dairy' in the winter on artificial grasses with profit, and ensilage appears to be a *par excellence* winter ration. The sorghum ensilage is chaffed with a small percentage of sugar-cane, in order to carry it through the chaffcutter, as it is not the best stuff to chaff by itself."

"Maize and sorghum were sown in alternate rows. Owing to dry weather, there was only a light crop; a reaper and binder was used to cut the crop, and the carting was done with rough sledges, each drawn by one horse; stacking began on 26th March, and the stack was opened in the second week in July. After cutting down the first bench of about 9 in. as waste, it was found to be in good condition. The cows did not take to it at first, but the calves ate it well. One by one, however, the cows began to eat it, and now nearly all of them are feeding on it, some of them taking it greedily."

"We are milking 22 cows, and it is a significant fact that a pronounced increase in the milk yield has followed. As they have no other change of food, I can only attribute this increase to the silage. As the feed* in our paddocks is now becoming

* Principally Rhodes grass.

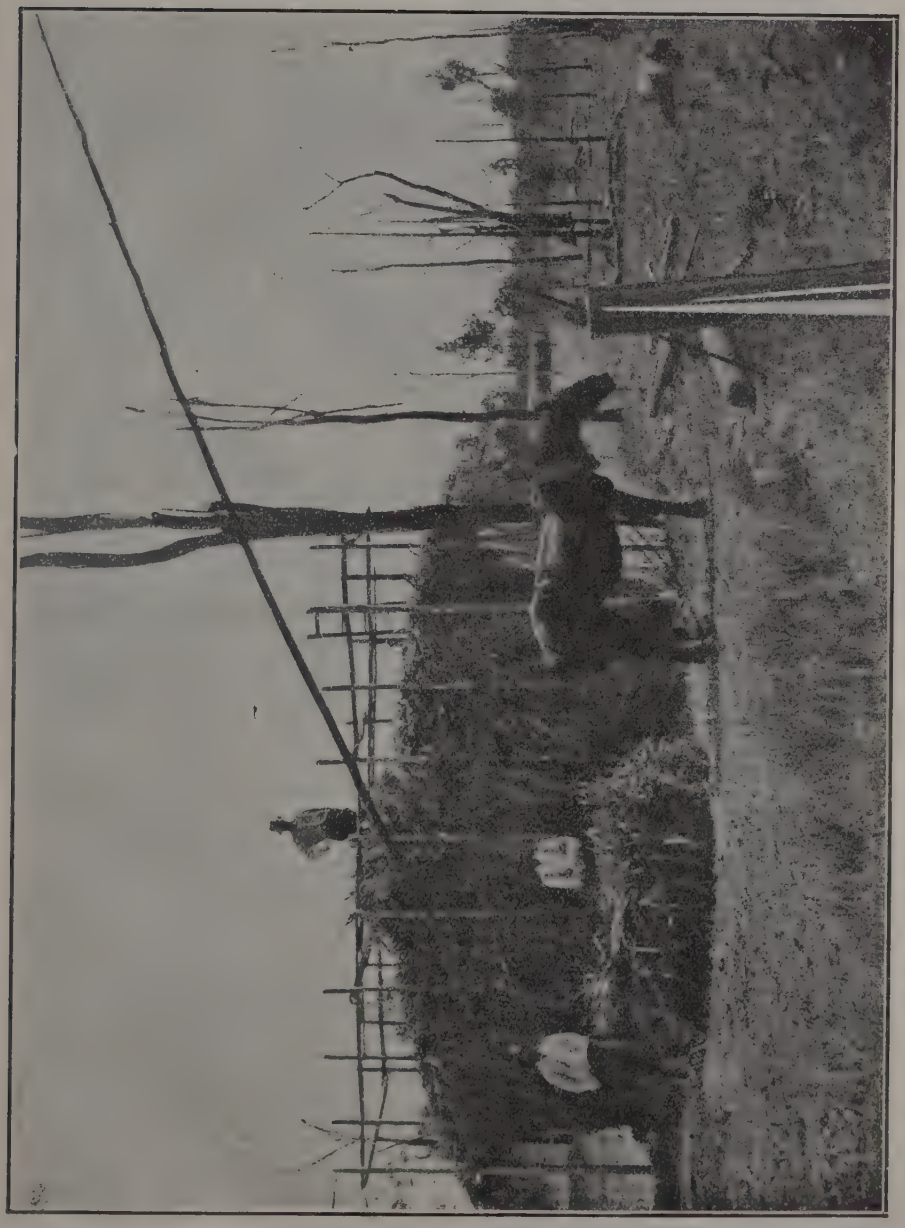

Plate 79.—Stack in course of construction, showing projecting "untrimmed ends," also "whip" hoist attached by means of a chain to a dead tree.

poor, and there is little prospect of its improving for a month or so, I view the silo, with its stock of compressed fodder, with great satisfaction, as I believe it will tide our dairy herd over the critical period of the year. This is its great value, and I more than ever see the wisdom of having laid by this winter store of food. During the coming summer I shall build a much larger stack on the same pattern, and hope to put by 70 or 80 tons of maize and sorghum for the winter. I assure you of my complete satisfaction at the result of your experiment on my farm."

"Am very well satisfied with the experiment and will build a considerably larger stack next year, all being well. I am not using up to the full amount, but what I am is keeping my cream and milk supply up to its regular amount; other hay, such as lucerne, oaten, and, at times, bush hay is mixed with it. My cows, when it was first offered to them, did not seem to care about eating it, but now they have got used to it, they nearly go mad to get at their feed."

"I opened one end of the stack to see what it was like, and am glad to say it is first class. I am perfectly satisfied with the experiment, and intend going in more for it in the future. When stacking was finished I put in 18 inches of earth on top, sloping from centre of stack to the ends; then five wires across the top and hung very heavy logs to them; two persons who have examined the stack, and know stack ensilage in other parts, state that it is in excellent condition."

Instances are not uncommon where maize crops have made good growth up to a certain stage and then failed to set grain through the dry weather. In the Southern Burnett part of the 1916 crop was affected in this way. Altogether about 50 stacks were erected in this locality alone, some ranging to 150 tons capacity.

Again in 1919 officers of this Department held demonstrations in silage making, and travelled through several districts with the object of assisting and advising farmers who were determined to turn their wilted crops to good account for fodder purposes, upwards of 12,000 tons of fodder being conserved, which assisted in saving the lives of many valuable dairy stock.

Inquiries made since show that the silage was found to be or great value and of satisfactory quality.

Points to be Observed.

Maize is one of the best and most satisfactory crops to grow, but any ordinary crop which is commonly used for green fodder or hay will make good silage.

The amount of labour involved in the handling of bulky green fodders may be considerably reduced when machinery is available for cutting and for binding into sheaves.

PLATE 80.

Stack silage demonstration at a dairy inspectors' special silage instructional course.

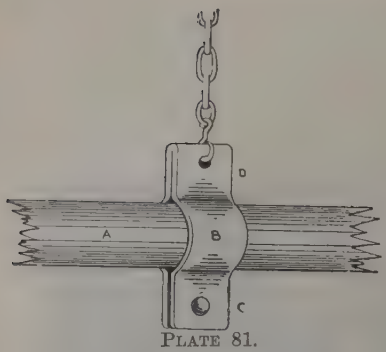

PLATE 81.

CLAMP FOR SUSPENDING WHIP.
(*a*) Whip spar.
(*b*) Clamp made from an old tyre 4″ × $\frac{5}{8}$″.
(*c*) Clamping bolt.
(*d*) Clamp welded and bored for hook.

Where large quantities of fodder are to be handled, a mechanical hoist is required for the higher levels of the stack. For hand work the "whip" type is preferable. In connection with the erection of a "whip" it is necessary that some means be adopted to prevent the spar slipping at the point of suspension, and the clamp shown in the sketch is an effective and useful means of preventing this. A substitute which is also very effective may be obtained by using an ordinary chain strong enough for the purpose and forming a "clove" hitch at the point of suspension, afterwards nailing on two small hardwood blocks to the "whip" spar, one above and one below the position of the chain on the spar; or drive in two strong iron staples. For horse power a yardarm and spar, with suitable blocks and the necessary wire rope and clutching dogs, make an effective combination, or pulleys and tackling may be substituted.

Fodder stacked in the open is subjected to an atmospheric pressure of 15 lb. to the square inch; and the stacker's chief concern should be to check combustion as much as possible—*i.e.*, by preventing the access of air to the mass.

Waste is unavoidable at ends and sides and is to be expected. A 25 per cent. depreciation will take place under indifferent conditions of stacking. The loss under good conditions should not be more than 12 per cent., provided attention is given to salient features and to working detail.

Coarse or fairly mature fodders require a greater dead weight pressure, and do not compact as readily as finer and more succulent plants.

Emphasis is placed on the fact that the success of a silage stack depends very largely on the consolidation of the contained fodder so as to exclude air, which, if admitted, would cause rapid deterioration.

"Use plenty of weight when stack is completed."

Variations in temperature are factors in the chemical and biological changes which take place in the process of turning a mass of green fodder into silage, but it is unnecessary to go to any more trouble than to check the processes of oxidation and fermentation which are responsible for high and abnormal temperatures. When undue heating takes place during the process of stacking, the temperature of the mass is readily reduced by putting on more green fodder, and by throwing a series of wires across the stack and hanging heavy logs to them; this may be done at the close of each day's operations. Where a limited number of animals are kept, long and narrow stacks are preferable, as the lesser superficial surface is exposed at the ends when feeding out. The higher the stack, in keeping with facilities for hoisting, the better.

Plate 82.—Framework and "trimmed" stack, showing an extra pair of uprights at each end, to which a crosspiece is attached for supporting the ends of the fodder when stacking.

It takes from 50 to 56 cubic feet of consolidated silage to make a ton. Crop yields may be computed and the dimensions of frame work arrived at. Abnormal settlement is to be expected, and weighted stacks usually settle down finally to a little less than two-thirds of their original height.

Heavy crops like maize and sorghums should be evenly sown in regularly spaced drills to facilitate harvesting by machines; the production of a medium thickness of stalk with a maximum of leaf should be aimed at.

Immature crops produce a less palatable and inferior article from a feeding standpoint. Where maize is to be chaffed into a silo, the crop may be left standing until the plants acquire the most nutriment—*i.e.*, when the grain attains the soft dough stage.

For stacking, it is an advantage to cut when the grain is in the "milk" stage before the stalks become too firm. Sorghum, Japanese millet, panicum, &c., should be cut when the seed heads or panicles are well formed and the grain about half developed.

The Stack.—The site should be chosen on a naturally drained piece of ground, and handy for feeding out to the stock, and yet as close to the crop as it is possible to get it.

When computing prospective contents of stacks several factors require to be taken into consideration, amongst which are—

Material used for silage;

Condition of crop at time of cutting;

And the amount of dead weight to be subsequently added to consolidate the stack.

Sorghums and millets are inclined to pack tightly and afford, on this account, a heavier average weight to the cubic foot than maize.

The following table of contents of various sized stacks may be taken as approximate; sorghums and millets, as previously mentioned, will weigh somewhat heavier:—

(At rate of 54 cubic feet to ton.)

SIZE OF PERMANENT STACK AFTER ENDS ARE TRIMMED.

Feet.		Tons.
12 × 9 × 15	=	30·0
12 × 10 × 15	=	33·3
15 × 9 × 15	=	37·5
15 × 11 × 15	=	45·8
18 × 10 × 15	=	50·0
18 × 12 × 15	=	60·0
21 × 12 × 15	=	70·0
21 × 14 × 15	=	81·6

In setting out a frame for a stack 18 ft. by 10 ft., ten poles on each side would be required, arranged as follows:—

Poles require to be 17 ft. 6 in. in length, and about 5 or 6 in. in diameter at butts. Sink the holes 20 to 24 in. in the ground. Top plates and tie beams should be securely twitched on close to the top of uprights, to make the framework rigid.

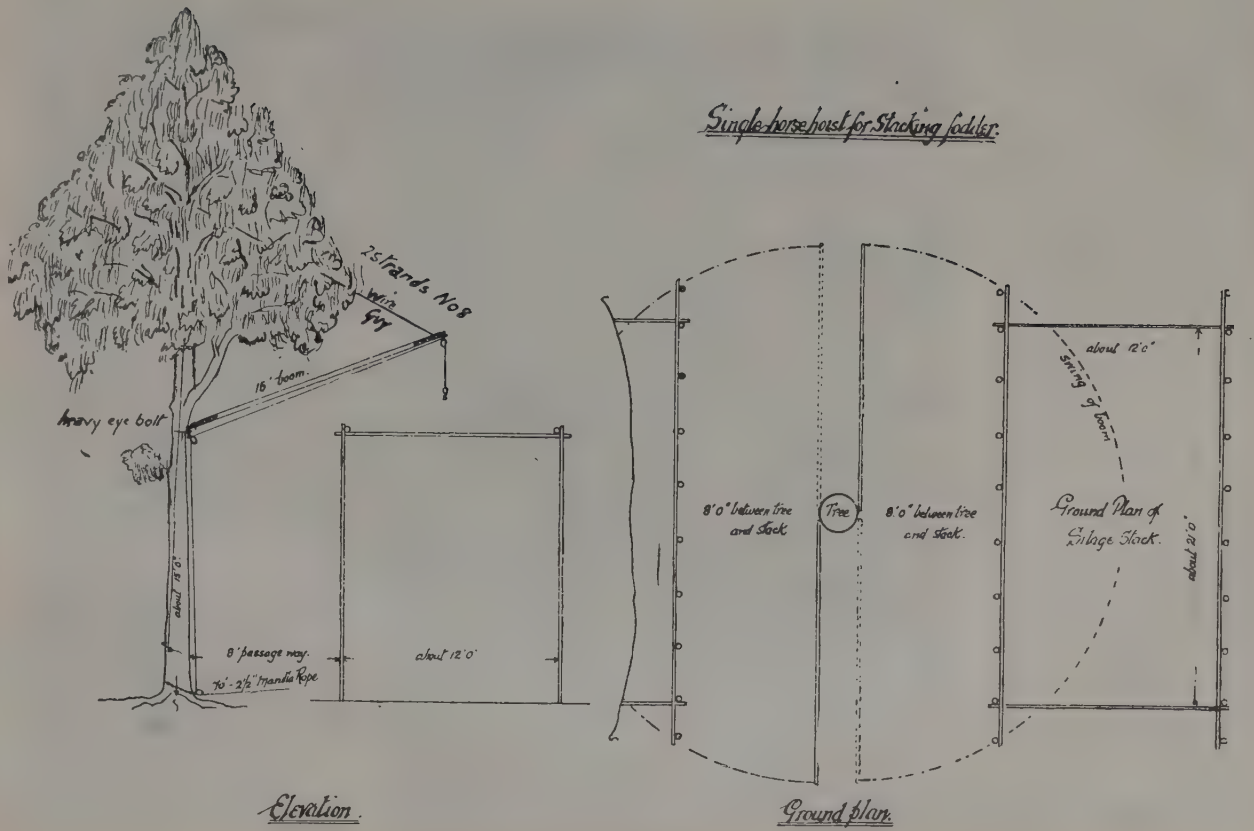
Single-horse hoist for Stacking fodder.
7 strands No 8 wire
15' boom
heavy eye bolt
8' passage way.
about 12'0"
10' - 2½" manilla Rope
8'0" between tree and stack
Tree
8'0" between tree and stack
about 12'0"
Swing of boom
Ground Plan of Silage Stack.
Elevation.
Ground plan.

PLATE 83.

When long-stalked crops are to be stacked, a fair average distance apart to place the uprights is 3 ft.; for shorter-growing crops this distance should be lessened accordingly.

Construct a framework of bush poles similar in design to those in accompanying illustrations, the dimensions of which and distances between the uprights being arranged so as to accommodate the amount and class of fodder on hand. Plant the poles firmly in the ground; attach the top plates with a wire twitch at a height of, say, 15 ft. from the ground. Brace across at ends and at centre, taking care that the pair of poles intended for carrying the central brace or tie are carried up high enough to give head room for the stacker when moving about on the upper levels of the stack.

PLATE 84.

Sledge cutter 5 feet 6 inches long by 2 feet 4 inches wide, showing projecting scythe blade (passed through mortice), also angle to set guide rod.

The uprights may be spaced at a distance apart of 3 ft. along the sides for maize and sorghums, and a minimum of 2 ft. for crops like barley and panicum. An extra pair of uprights should be put in at each end of the framework and braced securely; a crosspiece is attached to these to carry the projecting ends of the fodder until such time as they are trimmed off, the crosspiece subsequently being moved higher up to serve a similar purpose.

The position of that portion of the top plate, proving to be in the way for the "travel" of the whip, may require to be altered temporarily, or brought down to a lower level, and afterwards raised as stacking progresses.

The framework is of no value once the stack has settled down.

The "corn binder" is the most approved machine for cutting and binding maize and similar strong-growing crops into sheaves.

Plate 85.
Stack built under the supervision of the Department of Agriculture and Stock.

Lighter classes of crops may be handled to advantage with an ordinary "reaper and binder" or back-delivery "reaper."

The secret of handling heavy crops is to keep the stalks parallel in the bundles, whether cut by machine or by hand.

Maize and sorghums, if standing fairly upright in the drills, may be cut with a sledge cutter, which is simply a narrow sledge, set on a pair of runners and decked with 6 in. by 1 in. boards—a scythe blade is attached at one side at an angle adapted for slicing off the stalks, and should be braced in such a way as not to interfere with the cutting. Fix a guide rod to lay the plants down evenly in a regular swarth. They can then be kept fairly parallel when gathering them into bundles. For hand work an ordinary cane knife is very suitable.

Sledges are the handiest for short hauling distances; when the "hoist" is used, the fodder should be loaded on to suitably sized rope slings to be ready for lifting off.

Before commencing to stack, open out a shallow drain around the outside of framework, and use the soil for levelling off any surface inequalities within it. Place a layer of about 6 in. of waste green grass on the ground. Start stacking on this and KEEP ALL THE STACKS LAID THE ONE WAY. Transverse layers admit air far too much into the stack. Place the tassel end of the maize at least 3 ft. 6 in. over at both ends of the stack. When placing down the next layer, reverse the order, and if the fodder is at all on the dry side, damp it with water, and take the precaution also of placing some of the leafy portions of the fodder over any bare patches which may be present. When a height of about 3 ft. has been reached, lay down a board flush with a pair of uprights which are to form the true ends of the stack, and trim off the projecting ends of the fodder. Before starting to stack again, move the crosspieces up the outside pair of uprights, in order to support the ends of the second tier of fodder. Repeat the process of stacking and trimming off as previously noted.

A minimum thickness of not less than 2 ft. 6 in. of fodder should be stacked each day.

Keep a good camber in the centre of the stack, as heating soon causes abnormal settling there. Use judgment when binding the layers back, so as not to have any bumpy joints where the laps come. Care should be exercised in placing fairly straight stalks along the sides, and these should be well firmed down between each pair of poles, the laps being carefully watched to prevent any spaces being left.

The trimming of the ends, which should be done with a plain hay knife, ensures a consolidated section exposed to atmospheric influences, but the carefully concealed over-lapping of the stalks at the sides is essential for keeping the air from penetrating the mass; the more the air is kept out, the smaller the percentage of loss.

Settling takes place rapidly as soon as the mass begins to heat.

As previously noted, wires, heavily weighted, should be thrown over the stack at night time, attention being paid to the placing of separate wires within a few inches of each end of the stack where it is trimmed off. Remove wires and weights before continuing to stack next morning. Allow a big margin for settling. When finished to a full camber, spread

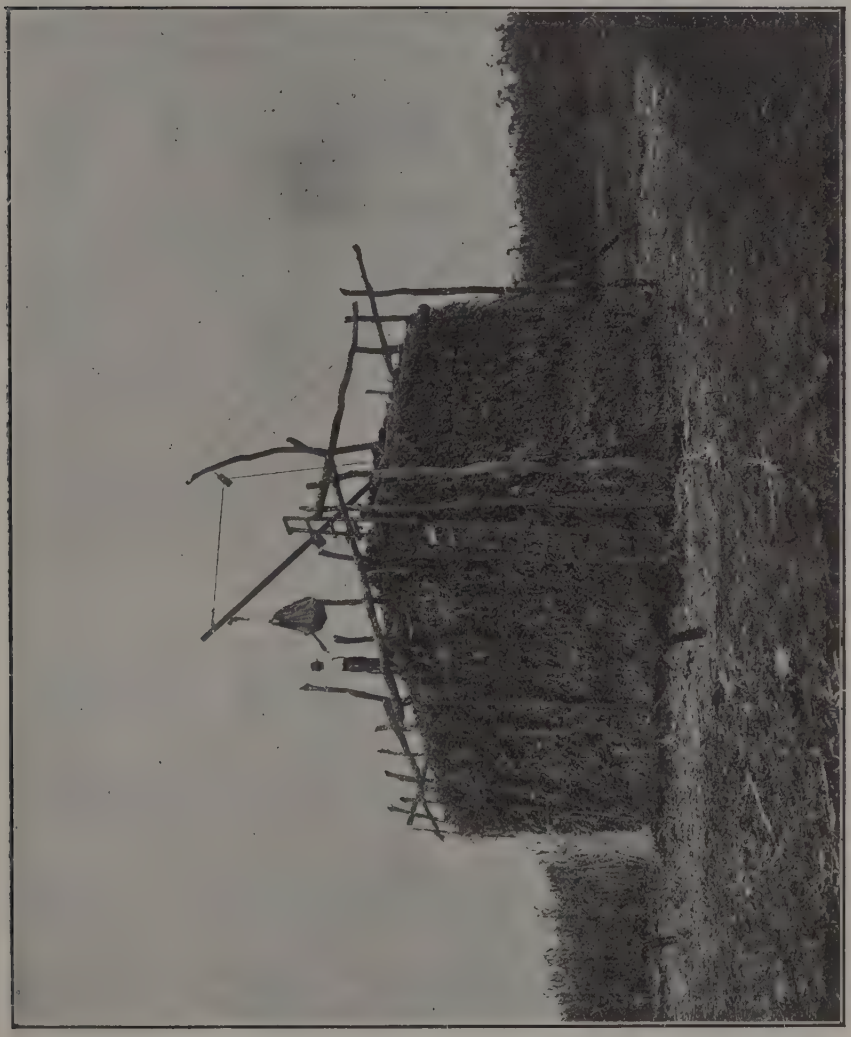

PLATE 86.

A stack nearing completion. Weighting material (stones) being hoisted by a horse prior to the topping off of stack with bush hay.

a layer of several inches of soft green grass or other close-textured weeds immediately on top of the silage; water this well. A framework of logs should then be placed evenly on top of the completed stack; these should be halved at the ends in a similar manner to the ground plates of an ordinary building. The weighting material is evenly disposed over the whole surface of the stack, the logs keeping the loose soil, or any other kind of material used to supply the weight, in its place. The layer of soil must average about 12 in. in thickness. The stack should then be topped off with bush hay or other waterproof material. A neat finish should be given to the roof, which requires to be built to a full eave, and all loose straws raked off. Wires are then placed across the top, and well weighted in order to keep them in position.

Other Weighting Material.

Stones, where they are easily procurable, may be substituted for soil, and the spaces between the stones can then be filled, if so desired, by soil.

Permanent weighting material is readily prepared by filling kerosene or benzine tins with concrete or with cement and sand compo., twisted wire handles being inserted in the mixture before setting takes place. This latter system economises labour where silage-making becomes a regular institution on the farm.

Although it is an advantage to allow the stack several weeks in which to settle down, and afford the necessary time which is required to effect the metamorphosis "from green fodder to silage," it may be opened at once should the fodder be then required. All that is necessary is to throw off some soil at the extreme end of the stack and cut down a narrow bench from top to bottom. The covering of soil on top keeps the rest safe from the weather.

Stacks are not meant to last more than a few months on account of depreciation from exposure to the weather, but instances have occurred where they have been kept for years, and then used to advantage. (Silage will keep, however, for many years in a well-built silo, and the depreciation is infinitesimal.)

Better results are obtained by chaffing the silage before use, and its passage through the chaffcutter is facilitated by using any strong-stalked fodder to assist in carrying it through.

A handy method to provide for feeding out to animals is to make receptacles, to act as makeshift troughing, out of ordinary 4-bushel sacks strung on No. 8 wires. Pairs of round uprights are put in at opposite ends of a line of fencing, the character, length, and gauge of which are designed to carry the sacks strung out on or sewn at each side to No. 8 fencing wires, running parallel to one another and placed at such a width apart as to form the suspended sacks into receptacles of the desired depth. Crosspieces may be nailed to a series of pairs of intermediate posts, and the holes for the wires bored through these to suit. The same class of feeding receptacles may be used for sheep, but should be made narrower and kept at a convenient height from the ground for feeding.

Brief Notes on Silage as Food.

"Silage is not a perfect food, and must be supplemented by other fodders and concentrates where full milk production is looked for."

Plants like maize, sorghum, and similar fodders, which contain a relatively high proportion of carbohydrates (starch, sugars, &c.) used in an animal's system for maintaining bodily heat, do not form perfect foods until more protein or flesh-forming substances are added in proportion, recognised as suitable in the aggregate, for making up a balanced ration. Leguminous plants—lucerne, cowpeas, field peas, &c.—are designed by Nature to supply this deficiency. In practice, it is found that the succulence of silage assists in the assimiliation by animals of dry foods and cured fodders.

A good combination of food for one day, sufficient for the support of one cow of 1,000 lb. weight, when yielding up to 3 gallons of milk, is arrived at by feeding 45 lb. of maize silage and 15 lb. of lucerne as hay or chaff; another ration, equally suitable, but not quite so rich, may be made up by using 40 lb. of the former and 20 lb. of cowpea chaff. The nutritive ratios of the fodders noted work out at 1 : 4·73 and 1 : 6·16, respectively. Analyses of fodders and silage present many variations. A general average per head per day for the support of a number of milch cows, when other feed is scarce, may be set down at 40 lb. of maize silage and 15 lb. of lucerne chaff. With this as a basis, the feeder is in a position to use his intuition and judgment in dealing with the individuality of animals.

MILLET HARVESTING.

Judgment must be exercised in deciding the time at which to cut millet for forage, and for all purposes care must be taken to harvest at the correct period. This should be the stage at which the crop is richest in nutrients, and most palatable and digestible.

When the majority of the seedheads or panicles have formed in the green pendulous stage is the correct time to cut for green fodder. It is better to err on the side of greenness, though millet cut too green has a laxative effect on stock; if too ripe there is a possibility of the feed becoming unpalatable.

The green crop contains much moisture in both stalks and foliage, and in consequence takes longer to cure than ordinary wheaten hay. If the crop is intended for silage, it may stand a little longer after heading out, but it must be cut prior to ripening.

As green feed, hay or silage, millet is very useful for dairy cattle, sheep, and young stock. For grazing it has been found to be excellent for sheep and cattle. Millets have no poisonous qualities, like sorghum, and may be fed when quite young. It is best, however, not to start feeding off until the crop has attained a height of at least 6 inches. After it has been well eaten down the stock should be removed until another growth is made. With suitable weather conditions, this should be only a matter of days, as the growth is rapid.

Japanese is by far the best variety for feeding off.

There is no more useful crop than millet as a quick-growing source of feed. It may be sown up to the end of February.—A. and P. Notes, N.S.W. Dept. Agric.

By H. W. BALL, Assistant Experimentalist.

IN view of the numerous inquiries reaching the Department of Agriculture dealing with what is commonly known as sorghum poisoning, it is evident that considerable confusion exists among the farming community as to those plants most liable to cause fatalities among stock.

For instance, millets are often mentioned, although the millets, including those varieties known as Setaria and White Panicum, do not contain any poisonous substance and may be grazed with safety at any stage of their growth. It is the sorghums which contain a hydrocyanic acid-yielding glucoside which is chiefly concentrated in the stalks during the early stages of growth. This HCN persists in decreasing quantities as the plant grows, entirely disappearing by the time maturity is reached. Stock should therefore not be allowed access to immature sorghum, especially if wilted through dry weather. Second growth and immature frosted material is also dangerous. Sorghums are most palatable and nutritious when the grain is in the milky stage, which is therefore the most opportune period at which to cut for silage or fodder purposes.

Sudan grass, which is classified botanically as a sorghum, being *Sorghum sudanense*, contains approximately one-quarter as much HCN as sorghum at corresponding periods of growth. Farmers should therefore be cautious in utilising this crop, especially if doubtful of the source of seed supply, as all sorghums hybridise readily. It is realised that many stockowners have fed off Sudan grass at all stages without ill-effects, but it is necessary to point out that fatalities have also been reported as a result of this practice.

Johnson grass (*Sorghum halepense*) is distinctly poisonous, as it contains a greater quantity of HCN than any of the cultivated sorghums. As Johnson grass seed closely resembles that of Sudan grass, buyers of Sudan seed should be particularly careful of the source of supply.

Sugar.

Growing conditions for the young crop were generally unfavourable during the latter half of December. Hot, dry conditions in the far North have seriously checked the cane, and although the absence of heavy rains will effectively check the emergence of beetles, the crop is urgently in need of moisture. Similar conditions obtain in the Mackay area, but the recent beneficial rains in the southern districts have maintained continuous crop growth in those parts, and there is every indication that heavy tonnages will again be recorded in 1935.

The south-eastern and Darling Downs farm and dairying lands are experiencing a bountiful season, prospects for all summer crops being excellent, while dairy production has reached a high level. Owing to this high production dairying is now the most remunerative occupation in many districts in spite of the lower price levels prevailing. At the time of writing the northern farming lands are still urgently in need of rain, so that cane, tobacco, and all seasonal crops are suffering. The central-western pastoral areas are also in the grip of drought and all stock routes are being closed.

Plate 87.—Auto-header Commencing a Round, Zeisemer Bros.' Farm, Bongeen, Darling Downs.

The sugar yield is estimated at 610,000 tons, as compared with 638,000 tons for the 1933 season. In many mill areas, however, large areas of cane were allowed to stand over.

Two of the mills in the Burdekin area are still crushing the 1934 crop, but it is expected that the decline in sugar content of the cane due to further growth will result in an early cessation.

Conditions for the 1935 crop were variable during the past month. In the southern cane areas generally favourable conditions were experienced, and the crop has made very satisfactory progress. There can be little doubt that most mills in these parts will again be faced with excessive cane supplies for the 1935 crushing.

Portions of the Mackay area have been favoured by thunderstorm rains, which have maintained reasonable growth in the crop; but in other parts soaking rains are urgently required to revive the wilting cane.

PLATE 88.—AUTO-HEADER AT WORK IN BADLY LODGED CROP, J. FLEGLER'S FARM, EVANSLEA, DARLING DOWNS.

The Burdekin district has experienced hot, dry conditions, and irrigation plants are working at full pressure.

In the far northern areas one of the worst dry spells on record has had a damaging effect on the young cane. The rainless conditions extended through December and the first half of January, but were broken by good rains during the past week. Doubtless the severe growth check will be reflected in the ultimate yields, and it is fairly safe to predict that no mills in those districts will this year produce cane in excess of their peak-year allotments.

Wheat.

Deliveries to the Board are practically finalised, and growers on the extensive plain lands are already working the clock round preparing their land in readiness for the autumn sowing. Heavy rains have held

PLATE 89.—AUTO-HEADER AT WORK, ZEISEMER BROS.' FARM, BONGEEN, DARLING DOWNS.

Plate 90.—A Harvesting Scene on J. Flegler's Farm, Evanslea, Darling Downs.

up the work in many districts, but much of this moisture will be conserved by judicious cultivation. The recent crop, although insufficient for the State's requirements, was of higher quality than in previous years. It is estimated that 1,500,000 bushels will need to be imported, so that Queensland wheat farmers still have some leeway to make up.

Cotton.

The seasonal conditions, while at times tending to make somewhat sappy growth of plant, have been favourable as a whole, for satisfactory development of the cotton crop. In sections of the Upper Burnett excessive rainfall in November promoted such rank growth of grass and weeds, as well as actually washing out the crops, that some abandonment of acreage resulted. Generally speaking, however, the growers have accomplished good control of the weed and grass problem, and the fields are in a satisfactory state of cultivation, although strenuous efforts have been required to bring this about.

Plate 91.—A "Battery" of Auto-headers Advancing en Echalon on J. Flegler's Farm, Evanslea, Darling Downs.

PLATE 92.—AUTO-HEADER DELIVERING THE BAGGED GRAIN ON J. FLEGLER'S FARM, EVANSLEA, DARLING DOWNS.

Although the crop was roughly a fortnight late at the start, the good growing conditions have forced plant growth, and the earlier-sown crops are about of normal development. Flowering is general in all districts, and given a continuance of such favourable conditions, the prospects are bright for very satisfactory yields being obtained generally. Seed sufficient to plant from 60 to 65,000 acres was applied for this season, and it is estimated that around 60,000 acres are now in condition to produce a yield. It appears likely that another record crop may be produced.

PLATE 93.—WHEAT DELIVERY AT THE GRAIN SHED, BONGEEN, DARLING DOWNS.

Peanuts.

The 1933-34 crop was the second largest handled by the Peanut Board. Prospects for the present crop are very encouraging, as 10,500 acres are sown, mainly to the Virginian and Spanish varieties, and sufficient moisture exists to carry the crop through to maturity. However, growers have a big task in cleaning up their areas following on the excessive rains experienced during January.

Tobacco.

Conditions are satisfactory in the Texas and adjoining districts, where the crops are well advanced. Planting out is in full swing in the Central districts, where normal growth and comparative freedom from disease is being experienced. The North is not so fortunate, as planting is largely held up for lack of rain, and those areas already planted are maturing too rapidly for best results.

General.

Maize grain has been in demand for drought relief, which should reduce the carry-over and help to stabilise prices. Heavy main crop sowings have been made under good conditions, with the exception of the Atherton area, where 25,000 acres sown during December urgently require rain.

The early potato crop has been satisfactory both for yield and the prices received. Growers will be interested to know that this Department has made small experimental sowings of Victorian and Tasmanian varieties, some of which have compared favourably with the varieties in general cultivation. However, it must be emphasised that while the trials are in progress no distribution of seed can be attempted.

Those contemplating the use of fertilizer are reminded that the bonus of 15s. per ton has been renewed until 30th June, 1935, the necessary application forms being available at all country post offices.

TO PRESERVE HARNESS.

1. Before oiling harness or other leather, add a little kerosene to the oil. This will prevent rats and other vermin attacking the leather.

2. Get a fresh shin-bone, break it open and extract the marrow. Melt the marrow down and add an equal quantity of castor oil. Rub the mixture warm into the leather, first washing the sweat and grease off with warm water and soft soap. Never use castor oil alone; it will perish any leather.

3. A harness dressing that will prevent rats from chewing the leather can be made by mixing a gallon of castor oil, a pint of salad oil, and ½ lb. beeswax.

4. To revive old, cracked harness, apply a mixture of 2 oz. beeswax, 1 oz. of lamp-black, and a pint of oil. To keep harness in good condition, wash it with potash water and when dry apply harness blacking. To keep leather pliable, rub tallow, lamp-black, or waste oil on.

5. To get a good home-made harness dressing, mix 2 lb. mutton fat with 3 lb. beeswax and heat over a slow fire. Add 4 lb. sugar, 2 lb. lamp-black, 2 lb. soft soap, ½ lb. indigo. For brown harness leave out the lamp-black and the indigo.

The Poultry Industry in Queensland.

By P. RUMBALL, Poultry Expert.

POULTRY-raising is now a very definite and important branch of agriculture. This is due largely, in the first instance, to the labours of the specialist breeder in the production of high-producing strains of birds; secondly, to the modern method of hatching and distribution of chickens; thirdly, to the more efficient method of feeding and general management; and, finally, to co-operative effort on the part of the producer.

Although the specialist poultry breeder has played a most important part in the building up of the organisations that exist, a very large percentage of our eggs are produced upon the general mixed farm, and it is considered by the writer that if further expansion of the poultry industry is to take place, such expansion would be sounder as a definite part of general farming rather than as a specialised calling.

Departmental Activities.

In the building up of the industry, the Government has been an important influence. On the staff of the Agricultural Department there have for many years been attached experts whose duty it has been to advise and instruct beginners in all phases of poultry culture. These officers have pursued an intensive educational campaign and have travelled from one end of Queensland to the other, advising and rendering assistance to all interested in the business.

As well as catering for the producer in this way, the Department for years conducted egg-laying competitions with the object of demonstrating to the breeder the variation in production that may occur among birds of the same breed, and to induce breeders to improve the production of their flocks by selection, and by only breeding from their highest producers.

The interest taken by poultry-raisers in the work has been evinced by poultry clubs and agricultural organisations building their own pens and conducting their own laying contests, and to-day we have no less than eleven egg-laying competitions conducted along the coastal area from Toowoomba to Cairns, clubs having taken up competition work, the Department vacated this field of activity and concentrated upon nutritional and disease research at the Animal Health Station, Yeerongpilly.

Several reports of the results of nutritional investigation conducted at the Station and a report on the results obtained with various methods of treating internal parasites have been published in the "Agricultural Journal." At the present time, further experiments are being conducted with respect to internal parasites, while no less than six experiments of a nutritional nature are under way.

The conducting of experiments, however, is not the only work carried out at the Animal Health Station on behalf of the poultry-raiser. The post-mortem examination of poultry has become in the last few years a very big item. This work, coupled with the correspondence entailed, together with disease investigation, is no small contribution to the welfare of the industry.

Poultry Clubs.

Poultry clubs are functioning in many centres throughout the State. With few exceptions club members meet regularly for the exchange of ideas, and informative addresses are given by the more skilled among its members or by some other person of authority. Many clubs, as previously mentioned, have taken an active part in the conduct of egg-laying competitions. This has brought before poultry-raisers living in close proximity to where these tests are conducted the advantages to be gained by the keeping of well-bred and well-fed birds better than any centrally conducted test could have done, and now it is the exception to the rule to see any but well-bred flocks on our farms.

Poultry clubs are also the means of disseminating the results of Departmental investigations conducted at the Animal Health Station, and from any other authoritative source.

Economic production has received the attention of clubs, the results of one—the National Utility Poultry Breeders' Association—being an outstanding achievement of co-operation.

Plate 94.—Mr. Stanley Lloyd.
Chairman of Directors, Poultry Farmers' Co-operative Society.

Successful Co-operation.

The Poultry Farmers' Co-operative Society is relatively a young organisation. It was one time known as "Nupba"—a title formed from the initials of the National Utility Poultry Breeders' Association.

Many of the members were not dependent on poultry-raising for a living, but had become associated with poultrymen through a lively interest, as amateurs, in the industry. They were quick to appreciate the difficulties under which poultrymen were struggling, and realising what a valuable place poultry-farming might and should occupy in the State's agricultural operations, conceived the idea of promoting this co-operative organisation to purchase and distribute foodstuffs, these being the most expensive items in the business of poultry-raising. They

recognised that the principles of co-operation would ensure honest trading, pure and high quality goods, and a saving of money by reducing the distributing cost of poultry foods. Further, they ensured that any profits resulting from the undertaking would remain in the industry.

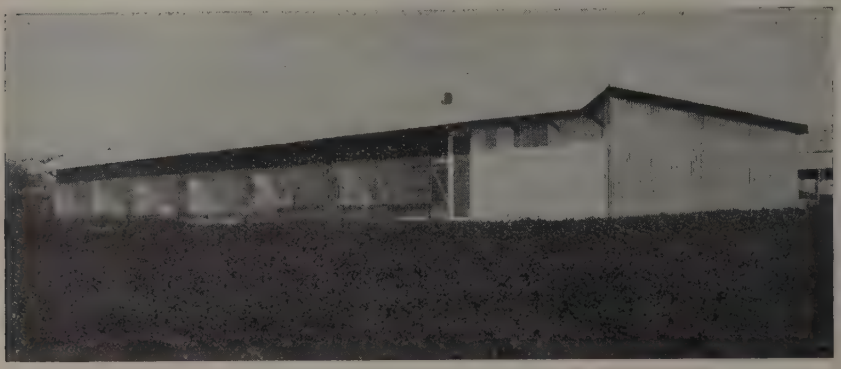

PLATE 95.

Intensive poultry-house at the Animal Health Station, Yeerongpilly. At the right is the feed-room; the brooding-pens are to the left.

Education in Co-operation.

The society is something more than a trading concern. It has an intimate knowledge of the requirements of its customers and, in addition to providing a service in regard to delivery which was previously unknown, it disseminates knowledge on poultry culture and offers free advice on any subject bearing on the industry, both verbally and by means of printed pamphlets. It is difficult to assess the value of the service the society has rendered to the industry, and it has been instrumental in lightening the poultryman's burden considerably by securing reductions in freight charges and improving generally the status of the industry, irrespective of the great saving in prices which has resulted from the combined operations of its members.

Apart from the small annual dividend on the capital invested, the whole of the profits of the society are distributed each year among members as a bonus on purchases, or used in the business for the

PLATE 96.

Intensive poultry-house at the Animal Health Station, Yeerongpilly. At the left are the brooding-pens; at the right is the feed-room. Note the ventilation space at the back.

creation of further benefits. In this way more than £35,000 has been returned to the society's customers during the past ten years.

Plate 97.
Intensive poultry-houses at the Animal Health Station, Yeerongpilly.

The Progress of the Society.

The society has celebrated its thirteenth birthday, having been established in July, 1921, when there were eighty-five members, who contributed a total share capital of £514. The present membership exceeds 1,600, and the share capital exceeds £6,000.

In July, 1921, 8 tons of bran and pollard were purchased by the society's members. The present output is more than 100 times greater, being over 10,000 tons, or over a million bushels annually. In addition,

over 200,000 bushels of wheat are used as grain, besides huge quantities of maize, barley, oats, and other cereals.

The first store secured for the society's business was in the basement of a bulk store in Little Roma street. Mr. Woodcock, the present manager, combined the duties of director, manager, secretary, storeman, and clerk. To-day there are no fewer than fifty-seven persons in regular employment.

PLATE 98.—INSPECTING THE PENS, POULTRY FIELD DAY, ANIMAL HEALTH STATION.

Trans-Marine Trade.

The society, in 1923, exported 35,000 dozen eggs to England, and in so doing made history, for it was the first occasion on which a co-operative or poultrymen's organisation had shipped Queensland eggs overseas.

The growth of the business is best shown by the following figures:—Turnover for eighteen months ending 31st December, 1922, £20,217; for year 1923, £12,276; 1924, £12,430; 1925, £22,166; 1926, £41,993; 1927, £57,760; 1928, £83,472; 1929, £109,075; 1930, £104,240; 1931, £91,002; 1932, £130,628; 1933, £144,703; and for 1934, approaching £200,000.

The society, in October, 1924, manufactured the first bag of "Red Comb" laying mash, and in so doing launched a new industry for the State. Prior to that date all manufactured balanced poultry foods were imported. This branch of the business has grown rapidly, and new plant is being installed, with a capacity of 1,400 bags daily.

So successful have been the results that the society is now turning out "Red Comb" dairy food, calf food, and pig food, and these give every indication of becoming as popular as the other "Red Comb" products.

Apart from the large sums paid to members as bonus on purchases, the society has saved the industry tens of thousands of pounds in the first cost of the articles sold. It has created a healthy competition to the advantage of its members and the industry generally.

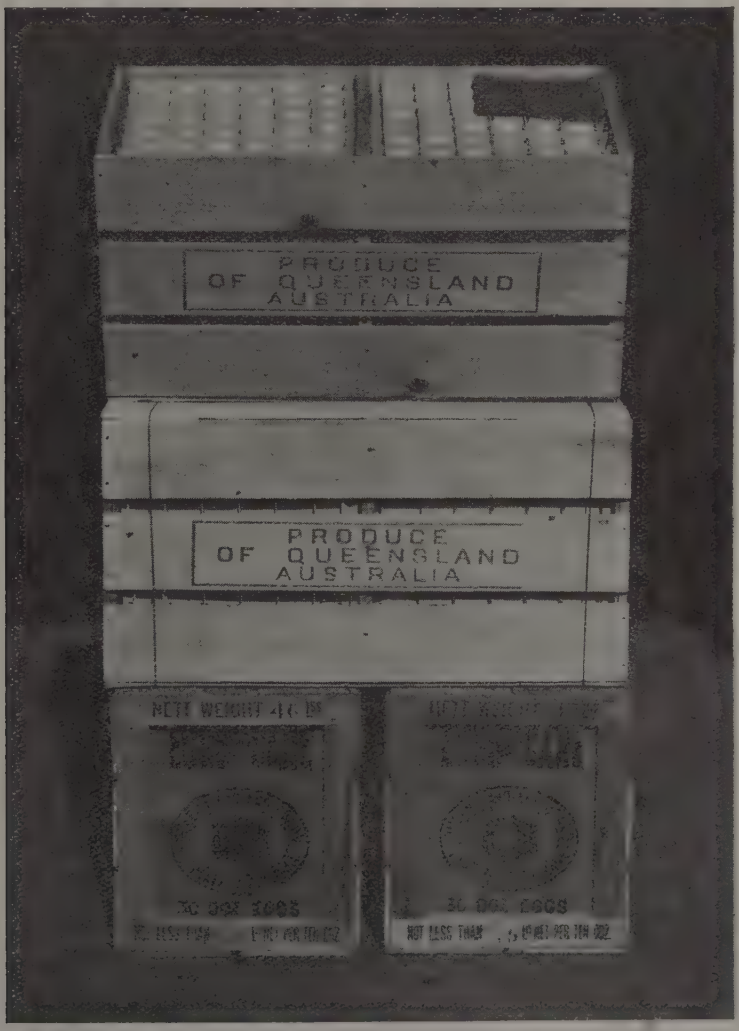

Plate 99.—Queensland Eggs Packed for Export.

Huge purchases on a co-operative basis are a benefit to farmers dealing from the society, and low overhead and working expenses have permitted profits to be made, notwithstanding the small margin over cost which the management allows. These profits, instead of being used for private gain, are retained in the industry.

PLATE 100.—TRAIN OF SPECIALLY INSULATED TRUCKS LADEN WITH EGGS FOR OVERSEA SHIPMENT, HAMILTON COLD STORE WHARF, BRISBANE.

PLATE 101.—QUEENSLAND EGGS FOR BRITISH BREAKFASTS.
A Shipside Scene at the Hamilton Cold Store, Brisbane.

Special attention is directed to the Members' Accident Benefit Fund. When a member of the society is permanently disabled or dies as the result of an accident, power has been given to the Board of Directors to grant to the next-of-kin or such person as shall have been previously nominated by the member a sum, not exceeding £250, equal to the member's purchases for the year ending 31st December immediately prior to the accident. This benefit is provided without any premium or additional cost to the member.

Plate 102.—A Section of the Cleaning and Grading Machinery, Poultry Farmers' Co-operative Society's Mills, Brisbane.

Organised Marketing.

Organised marketing has to the present been confined to the marketing of eggs, but there is every prospect that co-operative effort will be directed, in the near future, to the marketing of live and dressed poultry.

The Queensland Egg Board—a Board that has been functioning for approximately eleven years—controls in the main the marketing of eggs produced in Southern Queensland. On the Atherton Tableland a co-operative society with its headquarters at Tolga is operating on behalf of producers in that area.

That the operations of the Queensland Egg Pool are appreciated by the majority of growers is evidenced by the continuance of the Pool, which has now been submitted to several ballots for its continuance or otherwise. This Pool is controlled by a Board of five elected representatives of the producer, and the Director of Marketing.

Prior to the establishment of the Egg Board, eggs during spring months used to fall in value to a level that left little or nothing over

costs of production. To-day, despite considerable expansion, values during spring months are on a par with those ruling ten years ago. This condition is undoubtedly due to the Board's vigorous policy of exporting the surplus.

It may appear to many that as export has done so much to keep the industry in a reasonably sound condition, the Board had little to do apart from packing for this trade. The Board, which commenced operating during 1924, had met and surmounted many difficulties. The first was financial. The Government, however, helped it out in the early days by guaranteeing its bank overdraft to the extent of £10,000. The Board now is in the happy position of having a general reserve fund to the extent of £20,000, and are therefore more or less free from financial worry.

PLATE 103.—HIS EXCELLENCY THE GOVERNOR, SIR LESLIE ORME WILSON, INSPECTING THE MACHINERY AT "RED COMB" HOUSE, BRISBANE.

Included in the group are Messrs. Stanley Lloyd (Chairman of Directors), R. Woodcock (Manager), and C. Kidd (Secretary).

Although spring prices have been maintained by the Board that compare favourably with those ruling prior to the establishment of a Pool, the general average price paid to the grower during the year has fallen. This fall in values is due to the ever-increasing supplies received by the Board, with the result that for the greater part of the year more eggs are being received than the local market can absorb.

It may appear to some a simple matter for the Board to export the surplus production. This, however, is not the case. A considerable proportion of the eggs forwarded to the Board in the early days of the Pool were rendered unfit for export on account of the uncleanliness

of shell. To correct this was the Board's first problem. Many producers who had been supplying the local market for years when cleanliness of shell was not of such importance, and also many beginners in the business, were difficult to convince that something more in the way of cleanliness of shell was wanted for export than had been the case in past years. Again, large numbers of eggs came from relatively small flocks from mixed farms. With this class of producer the usual practice was to sell to the local storekeeper or wait until a sufficient quantity of eggs were on hand to justify consigning to market. The constant

Plate 104.—Poultry Meal Mixing Plant and Disintegrator.

effort on the part of the Board has fortunately convinced poultry-raisers as a whole that cleanliness of shell is essential, and the action taken by the Board in encouraging the formation of egg circles and the appointment of forwarding agents ensures a considerable proportion of our production reaching the Brisbane market of export quality. The writer is pleased to be able to inform poultry-raisers that a prominent inspector of exports, while on a recent visit to Brisbane, stated that for cleanliness and quality the eggs received by the Board from farmers were second to none in the Commonwealth. Although a statement of this nature has been made, there are still some producers forwarding eggs to Brisbane to whose produce it would not apply.

Export Packs.

Various styles of packing have been tried from time to time, with the result that we have a standard of pack which is unequalled on the English market, and, what is more, the costs of packing are considerably less than for what was considered in the early days of the Pool the

most attractive and economic pack. The reduction in costs is in no small part due to the foresight and business acumen of those controlling the Pool.

PLATE 105.—GRAIN MIXING PLANT.

Throughout the year, as well as during the export season, every egg received by the Board or its agents is candled and carefully graded as to quality and size. This action has been found essential in order to assure the sale of nothing but eggs true to label. That this practice is bearing fruit by way of increasing consumption is borne out by the statistics that accompany this article having reference to the Board's activities.

QUEENSLAND EGG BOARD STATISTICS.

Year.	Receivals.	Exported Overseas.	Total Sales, Export, Interstate, Pulp.	Local Sales.
	Dozens.	Dozens.	Dozens.	Dozens.
1924	1,445,000	Nil	234,555	1,210,445
1925	1,665,000	12,000	167,795	1,497,205
1926	2,777,000	189,000	436,975	2,340,025
1927	3,040,000	236,400	685,950	2,354,050
1928	3,967,000	823,860	1,580,018	2,386,982
1929	4,563,000	919,410	2,233,587	2,329,413
1930	3,935,000	831,150	1,934,361	2,000,639
1931	3,293,000	768,360	1,301,692	1,991,308
1932	3,728,000	1,301,430	1,667,109	2,060,891
1933	3,985,000	1,458,480	1,815,289	2,169,711

Plate 106.—Roma Street Premises of the Poultry Farmers' Co-operative Society.

Apart from the marketing of eggs, the Board has interested itself in many matters of importance to the poultry industry. It has taken an active part in the formation and work of the Egg Producers' Council, an organisation comprised of representatives of the principal egg-exporting organisations of the various States. It has played no small part in the preparation of egg grades governing eggs exported, and has interested itself in such matters as nutritional-feeding experiments, rail freights and their relation to both eggs and poultry fodder, and at all times has taken every possible action to further and protect the interests of poultry-raisers.

IMPORTATION OF SAANEN GOATS.

The Minister for Agriculture and Stock (Hon. F. W. Bulcock, M.L.A.) announced recently that he had been in touch with the Queensland Government offices in London regarding the cost of securing Saanen goats from Switzerland. Details had now come to hand and these indicate that first-class male Saanen goats, about 1 year old, can be purchased in Switzerland for from £5 to £6, and first-class female goats, two to three years old, from £3 12s. to £5 each. The cost of bringing the goats from Switzerland to Brisbane is, of course, considerable, and it has been calculated that approximately the cost of conveying the six animals from Switzerland to Brisbane would be somewhat as follows:—

	£	s.	d.
Freight, Basel to Hamburg, or	4	15	0
Freight, Basel to Antwerp	4	16	0
Harbour dues	1	0	0
Freight, Hamburg or Antwerp to Brisbane £14 14s. each	88	4	0
Exchange	1	1	0
Extras in Switzerland	1	10	0
Care of animals, £2 2s. each	12	12	0
London Quarantine expenses	15	5	0
Colmslie Quarantine expenses	19	13	6
Cartage	1	0	0
	£145	0	6

The above works out at about £24 3s. 5d. per animal, and with the initial cost it can be taken that the cost of landing the goats in Brisbane would range from £28 to £30 each. It would probably be preferable to ship the goats from Switzerland, via France, to London, where they could undergo a preliminary quarantine under the direction of the English Department of Agriculture and Fisheries. They could then be shipped direct from England to Australia.

Agricultural conditions of Switzerland being those of small peasantry, the breeding and keeping of goats is, therefore, very important. Swiss goats are rated highly for their great yield of milk and for their fertility, and the flesh of the young wethers is highly esteemed in that country.

The Saanen goat is widely distributed over the western part of Switzerland and is the most common dairy goat of the country. It was first developed in the Saanental and Simmental of the canton of Berne, these valleys still being the centre of the breed.

As Saanen goats are rather adaptable and thrive under a wide range of conditions, exports have been made to nearly all parts of the world, and they are now distributed in Germany, Austria, Servia, Russia, France, and on the American Continent. On an average the Saanen is of somewhat more than medium size. It is pure white in colour, hornless, and of rather slender build. In Switzerland good class does are stated to average about two quarts of milk per day.

Notes on Fruit Marketing.

JAS. GREGORY, Instructor in Fruit Packing.

Apples.

EARLY eating apples are now being marketed. Standard packing using sulphite wraps is the most desirable method of packing. Growers are recommended to line the cases with corrugated cardboards, which give great protection to the fruit. Fruit packed in this way is sought eagerly by country order buyers, in preference to unprotected lines. It must always be remembered that the country order buyer is usually willing to pay top market price if the fruit is satisfactory.

With the export season at hand, growers should give full consideration to the actual state of their crop. Many orchards have a high percentage of fruit damaged with hail. To remove the fruit fit for export from lines of this description would entail a lot of trouble, possibly only 30 or 40 per cent. being fit to export. The remainder of the crop would not be fit to market anywhere. By mixing the hail-marked fruit with the good it would be possible to get quite a satisfactory line for local marketing. This is always a problem to face in a state of affairs of this description. Growers wrapping fruit should be certain that no fly is allowed to be included. Buyers prefer wrapped lines, but for quite a number of seasons they expressed the opinion that growers only wrapped to enable them to include fly-stung fruit. It would be a pity to spoil the goodwill created during the last few seasons.

Stone Fruits.

Apricots and cherries are now finished. Peaches and plums are now obtainable in lines of good quality. Careful attention to packing is necessary to eliminate as far as possible the chances of Brown Rot infection. Brown Rot it particularly prevalent this season. Fruit skins damaged even minutely will become infected much sooner than sound fruit, so growers will realise that the utmost care must be taken during harvesting and packing operations to avoid skin damage. Sizing and packing are necessary when marketing.

Citrus.

The season is now finished. Measures should be taken to see that all sheds, implements, cases, and other utensils are cleaned up in readiness for next season. This should be done to help eliminate chances of Blue Mould being carried over to next season. A 5 per cent. solution of formalin is a good spray to use, 1 part of formalin to 20 parts of water finely sprayed, or used as a dip for boxes, &c.

Tomatoes.

The writer of these notes was recently in Melbourne, and had the pleasure of inspecting some really first-rate lines of Queensland tomatoes from the Redland Bay district. This was in late December during quite a warm spell of weather, and amply proves what has always been contended, that Queensland tomatoes can be exported to Melbourne and Sydney provided care is taken in picking to maturity and packing. The

same state of affairs does not exist with fruit exposed for sale in Stanthorpe shops, it being hard at the time of writing—early January—to obtain really good ripe lines of fruit, most of the fruit giving the impression of being picked while immature. This fruit is being obtained mainly from metropolitan districts.

Papaws.

Inspections on the Melbourne market showed several unsatisfactory lines of fruit on the market. Growers must pack papaws with care, carefully wrapping each fruit in paper and "nesting" them in woodwool, placing a substantial layer of woodwool on the top and bottom of the case. I would recommend the placing of corrugated cardboard at the sides of the box in addition to the woodwool on the tops and bottoms. One line of fruit that I inspected, on repacking, showed approximately 60 per cent. waste, all of which could have been avoided with a little more care. It was a pleasure to see the famous Sunnybank brand of "Melloripe' papaws open up, the packing being all that could be desired.

Mangoes.

Bowen mangoes arrived in varying condition. Fruit wrapped and layer packed with woodwool always opened up in good order. One or two lines of fruit I examined, packed unwrapped and without the padding, showed a high percentage of waste. Half-bushel cases appear to be the best type of case in which to send this fruit to Melbourne. I would suggest that it would be even better to send mangoes in trays, such as are used by the pear exporters. The trays are put up in bundles of threes, the complete package looking like a dump case. Each tray measures 18 inches by 14¼ inches by 3 inches, or sometimes as a variation to suit the size of the fruit, 4 inches deep. I think a package of this description would suit the trade better, as mangoes at present are not a well-known fruit in Melbourne. Retailers wishing to introduce this fruit to customers can only afford to buy small containers, in most cases even a half-bushel case being too large a quantity. The trays would also have an excellent display value.

Pineapples.

Blady grass is still used by many growers. It is not a popular packing with retailers, the fruit as a rule opening in a damp musty condition. Woodwool is to be preferred in all respects, looking better and opening up in a sweeter condition. It was noticed that some growers still persist in pulling the fruit instead of cutting it. One or two lines of Bowen pines were harvested too green, and in consequence were hard to sell. By the time these pines colour sufficiently to sell, the fruit has developed a shrivelled, wilted appearance, which makes it unpopular with the public.

TO MEASURE LENGTH.

To measure the length of, say, a drain, tie a piece of white rag round a spoke of the wheel of a buggy, the vehicle being then advanced until the wheel has made a complete revolution. A mark having been made on the ground before starting, the circumference of the wheel is easily measured. Then by driving along the proposed route of the drain and counting the number of revolutions of the wheel the total distance is readily arrived at.

Tobacco Fertilizer Trials.

Subjoined is a report on tobacco fertilizer trials conducted in the Mareeba and Dimbulah districts during the 1933-34 season by Mr. W. J. Cartmill, B.Sc., Analyst, Department of Agriculture and Stock.

DURING the 1933-34 season, an effort was made to establish fertilizer trials on each of the major soil types of the tobacco areas of the Cairns hinterland. The aim was to establish about a dozen trials, distributed over the fairly diverse soil types of this wide area. However, owing to extremely adverse seasonal conditions, it was not possible to accomplish this aim. The ravages of blue mould and other fungus diseases were so severe that seedlings could not be obtained for some of the trials. Repeated efforts to establish others were rendered unavailing by the destruction of the young plants by torrential rain and by disease attacks. Eventually four trials were established satisfactorily, and the results of these are set out herein.

The trials were uniform in type and treatment, the object being to find out the effects of the three principal plant foods on the growth and quality of the plants and the extent to which these effects are governed by the various soil types. The blocks were each one-half acre in area, divided into twenty-five small plots by a 5 x 5 Latin square system of replication. The treatments used were as follows:—N P K, N P, N K, P K, and C where—

N = { 160 lb. dried blood per acre (20 lb. N) / 130 lb. nitrate of soda per acre (20 lb. N) } = 40 lb. N

P = 500 lb. superphosphate per acre = 100 lb. P_2O_5.

K = 105 lb. sulphate of potash per acre = 50 lb. K_2O.

C = no fertilizer.

On one trial a treatment of N_APK was used (Boundy Bros.) where—

N = 200 lb. per acre of sulphate of ammonia.

A = 40 lb. nitrogen.

P and K are as previous.

These quantities of plant food were considered to be liberal for the requirements of the crop. The fertilizer mixtures used in the tests were prepared a few days prior to their applications in the field. The quantity for each plot was weighed and that for each row was measured so as to ensure a uniform application. The land was slightly ridged and the fertilizer distributed by hand in a broad strip along the middle of the ridges. The fertilizer was then covered by and mixed with the soil by further ridging and the land thus prepared for transplanting. The one departure from this procedure was in the case of J. Scott's trial at Koah. Here the grower transplated the seedlings to the block prior to the application of the fertilizer, as he considered they were in imminent danger of destruction by mould while in the beds. The fertilizer was applied and hoed in a few days after transplanting.

The usual cultural practices as are ordinarily adopted by the grower were used during the growth of the crop.

The weather conditions at the commencement of the trials were abnormal. The rainfall was excessive and the temperatures generally were rather low. Later, normal conditions prevailed.

There was a difference in growth on the various plots according to the fertilizer treatment, which was particularly pronounced during the early stages. It was difficult to obtain a good stand of plants on plots without either phosphorus or nitrogen in the fertilizer treatment and on the plots without fertilizers. In the first place the plants would not strike readily, and then made such very slow growth after striking that many of them were destroyed early by insect pests and diseases, and so many replants were necessary.

Plants in the P K plots usually made no pronounced growth for several weeks after planting; the leaves manifested a pale yellowish-green colour, generally were small in size and stiff; the plants themselves were spindly. When about two months old the plants made fair development, and eventually grew to a fair size with leaves showing a yellowness when compared with other plots. The leaf from these plots cured brightest, but the yields generally were low.

Plants in the N K plots made very poor growth for a considerable time after striking. At this stage they were dark-green in colour and had a squat rosette formation, and remained without making any appreciable growth for several weeks. Insect pests, such as leaf miner and stem borer, played havoc with these plants, also bringing about an uneven stand of plants under these treatments. The plants eventually made fair growth, but were always late in maturing and could not be cured a bright colour.

Plants on the N P plots grew well and seemed in no way to be affected in growth by the absence of potash from the mixture. Their growth up to maturity was as good as those on the complete mixture (N P K) plots. However, as the plants reached maturity they manifested to a marked degree the symptoms of potash deficiency. The leaves became very curled and puckered, but otherwise were not much blemished. The leaf usually straightened out during the curing and cured satisfactorily. However, the quality of the cured leaf was not good. It was usually of poor texture and without any elasticity.

The plants on the N P K plots were apparently normal. Owing to their having been grown fairly late in the season the quality of the leaf was not of a high grade, the colour being about equally bright mahogany and mahogany.

Plants on the plots without fertilizer were slow in making growth at the start, but later made fair development excepting on the virgin grey sandy soil, where the growth was poor. Apart from their backwardness the plants showed no outstanding peculiarity.

None of the leaf was much blemished by spotting, so that comparisons in this respect between the plots could not be made with any assurance of a distinction. If anything, the N K plots had least spot and the N P most.

Numerous practical difficulties were experienced in the working of the trials, but a number of these can be attributed to the adverse seasonal conditions and the lateness in starting the trials, and which probably would be avoided in a season of more favourable conditions and with an early start. As previously stated, the scarcity of seedlings, especially of healthy seedlings, precluded the establishment of more trials. It is reasonable to expect that this trouble would not be of such consequence if an effort is made to establish the trials early in the season. One trouble, however, will probably always be experienced—that is, that some of the farmers concerned herewith, show a reluctance to plant out the plots until they are satisfied of obtaining sufficient seedlings for their own intended acreage for the season, or even until they have planted up same. The seedlings put into the plots in these circumstances are often the poorest of the bed and are difficult to establish. This trouble would of course be mitigated by a favourable season. Some neglect is shown with regard to cultural attentions to the plots, especially when the total acreage planted is beyond the farmer's management. In such instances the plots suffer most. During the past season most of the work was done by the Departmental officers; it took up a large proportion of their time and interfered with their professional duties. The work in connection with these trials is much enlarged by the lack of communication throughout the area. At planting and harvesting time, especially at the latter, frequent visits had to be made to the plots to find out on what day the farmer expected to be carrying out these particular operations, for usually such cannot be foretold beyond a day or two. This required much travelling about.

The harvesting and stringing operations were usually done by the Departmental officers, and as the leaf from the various plots had to be labelled and kept apart, the work involved was large. The number of harvests from each trial varied from six to ten.

The question of growing the same variety of tobacco on all the trials is worth considering. During the past season the varieties differed according to what was grown by the various farmers concerned. It is doubtful whether the practice of growing different varieties on different plots would in any way effect the conclusions arrived at, but, nevertheless, it is thought that uniformity in this respect would be desirable if it could be attained. This would require that the seedlings for all the plots be grown in a common bed or that the farmers be distributed with seed of the chosen variety and requested to set aside a seed-bed for the plot. However, against this arrangement must be set the possibility of losing the seedlings on account of disease and being left with none to draw on, so the question arises as to whether it would not be preferable to take advantage of the first crop of seedlings that happens to be available, irrespective of the variety, provided, of course, that the one variety is used in any one particular trial.

Reviewing the results, they show in general that in all cases the greatest response is given to phosphoric acid, but that it differs in degree according to the soil type. The greatest effect is noticed on the lighter and more porous soils, where there is little or no growth when phosphoric acid is not supplied in the fertilizer mixture. On heavier soils the response is not so marked.

There is also a good response to nitrogen, most marked in the porous sandy soils and less so in virgin and the heavier types. There is no

significant difference in yield and no apparent difference in quality shown between the treatments of sulphate of ammonia and nitrate of soda—blood. However, as the quality of either was not of a high grade owing to the crop having been grown late in the season, the comparison in this respect cannot be regarded as reliable.

The effect of potash is more marked on quality than on yield. In only one instance did potash give a significant increase in yield; but an absence of potash was noticed in all cases to affect the quality of the cured leaf adversely. In some soils it may be found that excessive supplies of potash decreases the yield. This matter needs further investigation.

TOBACCO EXPERIMENTAL PLOTS.

STIRRUP BROS., MAREEBA.

Variety.—Cash.

Planted.—Early in February.

Harvested.—June-July.

Growth.—It was difficult to strike plants on the N K and P K plots and on the plots with no fertilizer. However, they all subsequently made fairly good growth. Though there was a difference in growth and in appearance of the plants under the different treatments during the early stages, there was not much during the later stages.

Soil.—Red sandy.

Subsoil.—Red sandy (sl. clayey).

YIELDS :—lb. per acre of cured leaf.

NP 332	C 185	NK 463	NPK 644	PK 616
NPK 478	NK 332	C 457	PK 538	NP 588
PK 288	NPK 519	NP 782	NK 641	C 575
NK 225	NP 400	PK 541	C 560	NPK 669
C 275	PK 510	NPK 819	NP 625	NK 525

Analysis of Variance.

Due to	Degrees of Freedom.	Sum of Squares.	Mean Square.	½ loge (Mean Square).
Rows	4	49,220·2	12,305·1	..
Columns	4	383,328·6	95,832·2	..
Treatments	4	149,001·0	37,250·3	1·8089
Errors	12	59,440·3	4,953·4	·8000
Total	24	640,990·1	..	..

Standard error (5 plots) $= \sqrt{4{,}953{\cdot}4 \times 5}$

$= 157{\cdot}3$

$= 6{\cdot}2\%$

Summary of Yields.

	NPK	NP	PK	NK	C
Yield (cured leaf), lb. per acre	625·8	545·4	498·6	437·2	410·4
Cured leaf, percentage mean yield	124·3	108·3	99·0	86·8	81·5

Discussion.

Significant response to phosphoric acid and nitrogen. No significant response to potash.

J. SCOTT, KOAH.

Planted.—Second week in March. Fertilizer applied a few days after planting and hoed in.

Harvested.—End of June. Plants uprooted and green weight taken.

Growth.—N K plots and plots with no fertilizer made practically no growth; P K plots moderate growth; N P and N P K plots good growth. The leaf on this block was blemished by mould spots to such an extent that the owner considered it would not repay harvesting the small quantity of leaf, as he had no more tobacco under cultivation. Consequently the plants were uprooted and the green weight taken.

Soil.—Light-grey sandy.

Subsoil.—Light-yellow sandy.

J. SCOTT, KOAH

YIELDS :—(Green leaf, lb. per $\frac{1}{50}$ acre plot).

NP 83	C 10	NK 11	NPK 94	PK 51
NPK 76	NK 14	C 17	PK 55	NP 66
PK 64	NPK 85	NP 125	NK 16	C 16
NK 9	NP 91	PK 77	C 14	NPK 81
C 8	PK 58	NPK 88	NP 73	NK 6

ANALYSIS OF VARIANCE.

Due to	Degrees of Freedom.	Sum of Squares.	Mean Square.	$\frac{1}{2}$ loge (Mean Square).
Rows	4	821·0	205·26	..
Columns	4	1,080·6	270·16	..
Treatments	4	28,043·4	7,010·86	3·2764
Errors	12	929·1	77·42	1·0233
Total	24	30,874·1	..	..

Standard error (5 plots) $= \sqrt{77{\cdot}42 \times 5}$.

$= 19{\cdot}7$

$= 7{\cdot}7\%$

SUMMARY OF YIELDS.

—	NPK	NP	PK	NK	C
Yield (green leaf), lb. per 1/50 acre	84·8	87·6	61·0	11·2	13·0
Green leaf, percentage mean yield	164·7	170·1	118·4	21·7	25·2

Discussion.

The increase due to phosphoric acid is very significant. Nitrogen has caused a significant increase, but potash has made no significant difference. This is a virgin soil, apparently very deficient in phosphoric acid.

BOUNDY BROTHERS, DIMBULAH.

Variety.—Cash.

Planted.—Second week in February.

Harvested.—June-July.

Growth.—Plants on N K plots were difficult to strike and made poorest growth during early stages. They were of a deep-green colour and assumed a squat-rosette form. P K plots were also very slow in early stages. Yellowish-green in colour, spindly in shapes with frenching of the leaves apparent.

N P K and N P plants made good growth of healthy appearance up to maturity, when leaves of plants on N P plots became curled and puckered. On N_A P K plots the plants made good growth. The colour of the leaves in the early stages of growth was a light-green, quite marked in comparison with N P K plants. Later (when six or seven weeks old) the plants quickly became of a deep-green colour. This in turn lightened off as the plants neared maturity. There was no marked difference in any respect between the cured leaf from the N P K and N_A P K plots. The plants in this trial were attacked by the stem borer during their early growth, and most of them were cut back to rid them of this pest. This operation did not apparently affect their subsequent growth.

Soil.—Light-pink gravelly sand.

Subsoil.—Light, red, sandy.

Yields:—Cured leaf, lb. per acre.

NP 450	N_A PK 907	NK 41	NPK 778	PK 238
NPK 603	NK 275	N_A PK 540	PK 316	NP 441
PK 207	NPK 738	NP 653	NK 250	N_A PK 719
NK 132	NP 666	PK 253	N_A PK 785	NPK 722
N_A PK 500	PK 250	NPK 450	NP 478	NK 244

ANALYSIS OF VARIANCE.

Due to	Degrees of Freedom.	Sum of Squares.	Mean Square.	½ loge (Mean Square).
Rows	4	61,131·76	15,282·94	..
Columns	4	136,034·96	34,008·74	..
Treatments	4	1,074,237·36	268,559·34	2·7966
Errors	12	85,546·08	7,128·84	·9821
Total	24	1,356,950·16	..	..

Standard error (5 plots) $= \sqrt{7128 \cdot 84 \times 5}$.
$= 189$
$= 8 \cdot 1\%$

SUMMARY OF YIELDS.

	$N_A PK$	NPK	NP	PK	NK
Yield (cured leaf), lb. per acre	690·2	658·2	537·6	252·8	188·4
Cured leaf, percentage mean yield	148·3	141·4	115·5	54·3	40·5

Discussion.

There has been a very significant response to both phosphoric acid and nitrogen. There has also been a significant response to potash. The difference between the sulphate of ammonia and the nitrate of soda-blood treatments is insignificant.

SHAW AND O'BRIEN, DIMBULAH.

Variety.—Hickory Pryor.

Planted.—Second week in February.

Harvested.—June and July.

Growth.—Poor growth on the N K and P K plots and on plots with no fertilizer during the early stages. Subsequently, all plots made fairly good growth. The fertility of the soil in this case seems to be above the average, which is probably the effect of residual fertilizer from previous applications.

Soil.—Pink, sandy.

Subsoil.—Reddish, sandy.

SHAW AND O'BRIEN, DIMBULAH.

Yields :—Cured leaf, lb. per acre.

NP 760	C 685	NK 640	NPK 665	PK 595
NPK 785	NK 715	C 700	PK 690	NP 795
PK 605	NPK 810	NP 805	NK 615	C 470
NK 545	NP 870	PK 625	C 535	NPK 695
C 630	PK 705	NPK 740	NP 725	NK 580

Analysis of Variance.

Dueto	Degrees of Freedom.	Sum of Squares.	Mean Square.	½ loge (Mean Square).
Rows	4	22,106	5,526·5	..
Columns	4	53,006	13,251·5	..
Treatments	4	132,966	33,241·5	1·7518
Errors	12	17,188	1,432·3	·1794
Total	24	225,266	..	..

Standard error (5 plots) $= \sqrt{1,432 \cdot 33 \times 5}$
$= 84 \cdot 6$
$= 2 \cdot 5\%$

Summary of Yields.

—	NPK	NP	PK	NK	C
Yield (cured leaf), lb. per acre	739	791	644	619	604
Cured leaf, percentage mean yield	108·8	116·4	94·8	91·1	88·9

Discussion.

Significant response to phosphoric acid and nitrogen. The decreased yield due to potash is barely significant.

PRODUCTION RECORDING.

List of cows and heifers officially tested by officers of the Department of Agriculture and Stock which have qualified for entry into the Advance Register of the Herd book of The Australian Illawarra Shorthorn Society, The Jersey Cattle Society, The Guernsey Cattle Society, and The Ayrshire Cattle Society, production charts for which were complied for the month of December, 1934 (273 days period unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (OVER 5 YEARS), STANDARD 350 LB.				
Elsie of Blacklands (365 days)	H. D. Giles, Biggenden	13,567·9	620·581	Jean's Monarch of Blacklands
Lorna 5th of Arley	E. W. Lawley, Maleny	9,184·15	388·12	Cinderella's Recruit of Greyleigh
Glenroy Lilly	W. F. Kajewski, Glencoe	8,560·37	379·032	Brilliant 2nd of Oakvale
SENIOR, 4 YEARS (OVER 4½ YEARS), STANDARD 330 LB.				
Springleigh Primrose 2nd (365 days)	Moller Brothers, Boonah	12,307·7	488·916	Red Knight of the Cedars
SENIOR, 3 YEARS (OVER 3½ YEARS), STANDARD 290 LB.				
Meadowvale Iris 5th	W. F. Kajewski, Glencoe	8,507·	361·602	Youll Do of Meadowvale
Westbrook Lark 5th	W. F. Kajewski, Glencoe	7,263·67	291·359	Sheik of Upton
JUNIOR, 3 YEARS (UNDER 3½ YEARS), STANDARD 270 LB.				
Glenroy Ruby	W. F. Kajewski, Glencoe	7,644·98	316·902	Empress Kitchener of Burradale
SENIOR, 2 YEARS (OVER 2½ YEARS), STANDARD 250 LB.				
Glenroy Emerald (365 days)	W. F. Kajewski, Glencoe	11,439·26	438·688	Clenroy Kitchener
Trevlac Rosette	W. J. Freeman, Rosewood	6,507·5	296·329	Butter Boy of Rhodes View

JUNIOR, 2 YEARS (UNDER 2½ YEARS), STANDARD 230 LB.

Wandegong Dorothy	G. D. Lindenmayer, Binjour	9,312·5	338·662	Emperor of Spurfield
Meadowvale Favourite 19th	W. F. Kajewski, Glencoe	8,087·29	331·488	Youll Do of Meadowvale
Rhodesview Nancy 9th	W. Gierke & Sons, Helidon	6,739·22	298·842	Blackland's Prospector
Cedargrove Champion 6th (265 days)	W. J. Freeman, Rosewood	7,170·	296·825	Duke of Cedar Grove
Euroa Rexona	H. T. Lindenmayer, Mundubbera	8,084·	283,305	Swagman of Clonagan

JERSEY.

SENIOR, 4 YEARS (OVER 4½ YEARS), STANDARD 330 LB.

Billabong Daisy (365 days)	J. Mollenhauer, Moffatdale	10,432·1	543·2	Premier of Calton

SENIOR, 2 YEARS (OVER 2½ YEARS), STANDARD 250 LB.

Hampstead Sapphire	Cecil Roberts, Harristown	5,916·59	326·214	Kelvinside Favourite's Raleigh

JUNIOR, 2 YEARS (UNDER 2½ YEARS), STANDARD 230 LB.

Bellgarth Girlie	A. R. Slaughter, Clifton	5,906·85	333·56	Bellefaire Blonde's Noble Masterpiece
Lyndhurst Mary	J. B. Keys, Gowrie Little Plains	5,689·41	305·871	Lyndhurst Glider

GUERNSEY.

JUNIOR, 3 YEARS (UNDER 3½ YEARS), STANDARD 270 LB.

Linwood Sunbeam	A. S. Cooke, Maleny	6,557·25	335·951	Moongi Bright Boy

AYRSHIRE.

JUNIOR, 2 YEARS (UNDER 2½ YEARS), STANDARD 230 LB.

Fairview Myola Juliette	R. M. Anderson, Southbrook	5,843·8	268·382	Longland's Bonnie Willie 2nd

Land for Grazing Homestead Selection

BLADENSBURG RESUMPTION.

WINTON DISTRICT.

40,430 acres .. .. Sheep land.

Portion 2, parish of Williams, situated on Williams and Meteor Creeks, about 32 miles south-west of Winton, will be opened for Grazing Homestead Selection at the Land Office, Winton, on Tuesday, 26th March, 1934.

Term of lease, 28 years; rent, 1¼d. per acre for first 7 years. Provisional valuation of improvements, £2,150. The improvements consist of fencing, a hut, sub-artesian bores, and equipment.

Part of the area is rough, but the greater part consists of open downs grassed with Flinders, Mitchell, button, blue, and other grasses.

The area is sufficiently watered, and is suitable for woolgrowing, fattening, and breeding.

Stocking conditions will apply.

Free lithographs and full particulars obtainable from the Land Agent, Winton, the Land Settlement Inquiry Office, Brisbane, and the Government Intelligence Bureaux, Sydney and Melbourne.

TO NEW SUBSCRIBERS.

New subscribers to the Journal are asked to write their names legibly on their order forms. The best way is to print your surname and full christian names in block letters, so that there shall be no possibility of mistake.

When names are not written plainly it involves much tedious labour and loss of valuable time in checking electoral rolls, directories, and other references. This should be quite unnecessary.

Some new subscribers write their surname only, and this lack of thought leads often to confusion, especially when there are other subscribers of the same surname in the same district.

Everything possible is done to ensure delivery of the Journal, and new subscribers would help us greatly by observing the simple rule suggested, and thus reduce the risk of error in names and postal addresses to a minimum.

Answers to Correspondents.

BOTANY.

Selected from the outward mail of the Government Botanist, Mr. Cyril White, F.L.S.

Russell River Grass.

C.P. (Gympie)—

Paspalum paniculatum, Russell River Grass, a very common grass in North Queensland. It was much boomed as a fodder some years ago under the name of *Paspalum galmarra*, but has since gone out of favour. Like some other grasses, however, such as Molasses Grass, stock seem to take to it readily when other feed is not available. In North Queensland, where the grass is very common, especially on parts of the Atherton Tableland, horses are said to be remarkably fond of the seed heads, and when feeding on them have a very sleek appearance with glossy coats.

The Bottle Tree.

A.H.B. (Brisbane)—

The common Bottle Tree of the Burnett district is *Sterculia rupestris*. The genus is a fairly large one and contains some well-known Australian trees. Two other species of Sterculia are known as Bottle Trees in Queensland; one, which grows in the scrubs in the coastal belt, is known as the Scrub Bottle Tree; the other, with a large lobed leaf and common in parts of Central Queensland, on the coast and on some of the islands of the Whitsunday Group, is known as the Broad-leaved Bottle Tree. Neither of these produces anything like so shapely a "bottle" stem as the one from the Burnett and parts of the northern Darling Downs.

The nearest ally of the Bottle Trees is the Currajong. The seeds of the Currajong have been used as a substitute for coffee, though when roasted and ground they have far more the flavour of cocoa. This is not surprising as botanically our Bottle Trees and Currajongs are very closely related to the Cocoa Tree which produces the cocoa of commerce. Possibly Bottle Tree seeds could be used in the same way as those of the Currajong, although we have not heard of their being so employed anywhere in the country where we have been.

The Bottle Tree referred to possesses what is known to botanists as dimorphic foliage, that is, the leaves are of two distinct types, those on the young trees being very different from those on the adult or large trees. In the seedling trees they are very narrow and radiate out like a number of thin fingers. In the adult trees the leaves become shorter and broader, and quite entire or very slightly lobed. The flowers are insignificant. The male and female flowers are distinct, but borne on the same tree, some trees bearing a preponderance of male, others a preponderance of female flowers. This accounts for the fact that some trees bear so much heavier crops of seed than others.

A very beautiful member of the Sterculia family in flower in the coastal scrubs or jungles from the middle of November till shortly after Christmas is the Flame Tree (*Sterculia acerifolia*), a tree with a wide range in its wild state from the Illawarra district of New South Wales to the Cairns district in North Queensland.

Birdwood Grass.

"Inquirer" (Toowoomba)—

We have made some inquiries about Birdwood grass and have received a letter from Mr. C. A. Gardner, Government Botanist, Perth, Western Australia, who informs us that it is *Cenchrus biflorus* and was sent by General Birdwood to one of his sons-in-law in Western Australia. It has proved an exceedingly hardy grass of particular value for the dry, summer-rainfall areas of that State.

This Department has experimented with two species of Cenchrus, namely *C. pennisetiformis* and *C. ciliaris*. These certainly have promise for some of the northern parts of the State, and we strongly suspect that the one we grow under the name of *Cenchrus pennisetiformis* is the same as Birdwood grass. It is known here and in the Northern Territory as Buffel grass.

Flame Tree. "Peanut" Tree.

A.I.B. (Eumundi)—

1. The Flame Tree (*Sterculia acerifolia*), a native of coastal Queensland and Northern New South Wales. In some of the scrubs the trees reach a very large size. It is quite common now as a garden and ornamental tree. When in flower the tree is a very brilliant sight, but the individuals vary considerably in the amount of bloom they produce.
2. *Sterculia quadrifida.* The only local name we have heard applied to this tree is Peanut Tree. The seeds when freed of the black coatings are quite palatable nuts.

The Candle Nut.

INQUIRER (Brisbane)—

The specimens have been determined as the Candle Nut (*Aleurites moluccana*), a native of Northern Queensland and widely spread through the Pacific. It is much planted as an ornamental and nut tree in many parts of the State. The nuts are edible, but great care must be exercised in eating them as occasionally they cause severe vomiting and purging. Possibly in these cases the nuts have been in a rancid condition when eaten, but on this point we are not too sure. From personal experience one may suffer very severely from eating candle nuts at the "wrong time." The nut contains a useful drying oil, but this is nothing like so valuable as that of the allied *Aleurites Fordii* and *Aleurites montana.* Attempts to find a market here for these nuts on account of the oil they contain have never met with any success.

Eucalypts and Acacias.

J.D.P. (Calvert)—

The number of species of Eucalypts and Acacias varies as given by different authors according to their view of the limits of the species, but the following are approximately correct:—

Eucalypts in Australia	550
Eucalypts in Queensland	85
Wattles or Acacias in Australia	400
Wattles or Acacias in Queensland	130

Grasses Described.

L.W.B. (Esk)—

Brachiaria decumbens.—A perennial grass, so far as known, confined in its wild state to Uganda, tropical Africa. The genus Brachiaria is a fairly large one and practically all the species are excellent fodder plants. We have several native species in Queensland and practically all are relished by stock.

Brachiaria brizantha.—A very robust perennial species of Brachiaria, a native of tropical Africa where it is widely spread throughout Upper and Lower Guinea, through the Nile region, and through many parts of the Mozambique district. It seems to have quite good possibilities as a fodder here.

Lespedeza stipulacea.—A leguminous plant allied to the Korean Clover and Japanese Clover. We think it is the poorest of all the Lespedezas introduced, and do not consider it as having much value at all. It grows during the summer months, dying down in autumn with the approach of winter.

Chloris pycnothrix.—Rather a small-growing grass. Judging just from appearances it does not seem to possess any outstanding value, though experience alone will show what its value actually is.

Digitaria Pentzii.—A species of Woolly Finger grass. It and an allied species (*Digitaria eriantha*) seem to have quite good possibilities in Queensland as fodders, particularly for growing on some sandy lands where other grasses will not thrive. We think there is country of this type in the Esk district that graziers have found rather hard to grass, and in such places it might be well worth trying.

Pennisetum ciliare.—This is a species of Buffel grass. It is widely spread in Africa, both in South Africa and Tropical Africa, Madagascar, Canary Islands, Madeira, Sicily, and extending eastwards to India. It seems to have good possibilities in some districts.

Trees Suitable for the South Burnett.

Inquirer (Murgon)—

Our choice for an avenue of trees for Murgon would be the so-called Portugese Elm (*Celtis sinesis*), a tree of which we have seen some beautiful examples in the Burnett district. The crown is very spreading and the tree does not grow too high. The Portugese Elm is a deciduous tree, but it loses its leaves for only a very short time in winter and makes a very dense shade during the hotter months. If you would prefer an evergreen, Tulip Trees (*Arpullia pendula*) could either be planted by themselves or alternating with *Celtis sinensis*. Other trees that would grow very well in your district and make shapely avenue or street trees are the Crow's Ash (*Flindersia australis*) and Yellowwood (*Flindersia Oxleyana*). The following are some other trees you might care to plant either as individual specimens or as avenue trees about the town:—

The Camphor Laurel (*Cinnamomum camphora*). Makes a very shapely tree but the root system is rather extensive, and when planted near private gardens residents are apt to complain that the roots rob the soil of all nutriment. A good deal of complaint has been made in this direction in Brisbane.

Jacaranda. The common Jacaranda makes a good avenue tree. It requires a little attention in its younger stages. Grafton, New South Wales, which has been called the City of Trees, is noteworthy on account of some exceptionally fine avenues of Jacarandas.

Figs. Some of the Figs would do well in your district. Probably the best is *Ficus platypoda*, the small-leaved Moreton Bay Fig, or *Ficus rubiginosa*, the Port Jackson Fig. The latter makes an exceptionally shapely tree, not too large, but like all Figs the roots are very extensive and apt to do damage to gutterings, water mains, footpaths, &c.

Pines. Some of the exotic pines make densely foliaged, evergreen trees. For planting at Murgan I should think either *Pinus longifolia* or *Pinus caribaea* would be the best. Young plants perhaps could be obtained from the nearest nursery of the Forestry Department.

A Poisonous Berry (*Solanum Seaforthianum*).

J.H.S. (Atherton)—

The specimen represents *Solanum Seaforthianum*, a native of the West Indies and Tropical America that of late years has run out and become quite naturalised in many of the rain-forest areas of Queensland. Specimens have been received at different times with the report that children have been made violently ill through eating the berries, though we do not know that any actual deaths have been reported. The berries are often accused of poisoning poultry, though, strange to say, fruit-eating birds must eat the fruits with impunity as it is evidently by them that the plant is spread. The reason why fruit-eating birds may eat the berries with impunity is said to be that the solanin is contained mostly in the seeds and these are avoided by the birds.

Wild Sorghum.

H.H. (Iveragh, N.C. Line)—

The specimen forwarded with your letter of 11th instant represents *Sorghum verticilliflorum*, commonly called Wild Sorghum, now very common as a naturalised grass along railway cuttings, cultivation headlands, or, in fact, anywhere where the ground has been disturbed. There are several closely allied Sorghums which are very difficult to tell from small pieces of the seed head. These are Sudan grass, Johnson grass, and the Wild Sorghum, but we think there is no doubt that the one you send is as determined. It is a tall-growing grass and is distinguished by its perennial root system. When the plant is dug up or pulled up buds of young shoots can be seen at the base. Johnson grass has long, white, underground runners and Sudan grass has an annual rootstock. Wild Sorghum is not a particularly good fodder plant, as from tests carried out by the Agricultural Chemist it is shown to be exceedingly strong, at practically all stages of its growth, in a prussic acid yielding glucoside. In this respect it is one of the worst of the Sorghums so far tested.

General Notes.

Staff Changes and Appointments.

Mr. Halley Atherton, of Tedlands, Koumala, has been appointed an Honorary Ranger under and for the purposes of the Animals and Birds Acts.

Mr. W. E. Burnett, Inspector of Stock, Cadarga, via Chinchilla, has been appointed also an Inspector of Dairies.

The following persons have been appointed Honorary Rangers under the Animals and Birds Acts for the protection of native fauna in the Clermont district:—Mr. Wm. R. Tindale, Manager, Craven Station, Clermont; Mr. C. D. Tindale, Manager, Pacha Station, Clermont; Mr. Thos. Salmond, Manager, Albro Station, Clermont; and Mr. G. A. Fairbairn, Manager, Logan Downs Station, Clermont.

In order to ensure the better protection of native fauna, particularly the Torres Strait Pigeon, in the Mossman district of North Queensland, Mr. Wm. R. Porter, of Mossman, has also been appointed an Honorary Animals and Birds Ranger.

Messrs. T. G. Graham (Instructor in Agriculture, Mareeba), E. F. W. Ball (Assistant Experimentalist, Brisbane), and W. J. Cartmill (Analyst, Mareeba), officers of the Agricultural Branch of this Department, have been appointed also Inspectors under the Diseases in Plants Acts.

Senior Sergeant J. A. D. Bookless, Toowoomba, and Constable M. H. Baker, Ingham, have been appointed also Inspectors under the Slaughtering Act.

Mr. J. D. W. Ogilvie, Grading Inspector, Dairy Branch, has been appointed Dairy Instructor, Department of Agriculture and Stock.

Mr. W. B. Horneman, Dairy Inspector, Rosewood, has been appointed also an Inspector under the Diseases in Stock and Slaughtering Acts.

Mr. S. A. Clayton, Inspector of Stock and Dairies, Caboolture, has been appointed also an Inspector under the Slaughtering Act.

Messrs. J. C. J. Maunder, C. R. Mulhearn, A. L. Clay, and R. Nott, Government Veterinary Surgeons, Department of Agriculture and Stock, have been appointed also Inspectors under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts.

Messrs. F. N. King and J. B. King, of Tulliwallah Station, Clermont, and Mr. A. F. Brand, Norwell, have been appointed Honorary Rangers under the Animals and Birds Acts.

On account of transfers to other centres the following Police Magistrates and Clerks of Petty Sessions have been relieved of their positions of chairmen of the local sugar cane prices Boards undermentioned:—

Messrs. A. H. Aitkin—Goondi, Mourilyan, South Johnstone, and Tully Local Boards. H. B. Carney—Macknade and Victoria. M. Gallagher—Farleigh, Marian, Plane Creek, and Pleystowe Local Boards. C. D. O'Brien—Bingera, Fairymead, Gin Gin, Millaquin, and Qunaba. J. C. Baker—Isis. F. W. Schafer—Mossman.

The following have been appointed to the vacancies thus created:—

Messrs. W. Rillie, Police Magistrate, Innsfail—Chairman, Goondi, Mourilyan, South Johnstone, and Tully Local Boards. C. B. Buxton, Police Magistrate, Ingham—Chairman, Macknade and Victoria Local Boards. T. H. Kennedy, Police Magistrate, Mackay—Chairman, Farleigh, Marian, Plane Creek, and Pleystowe Local Boards. A. H. Aitkin, Police Magistrate, Bundaberg—Chairman, Bingera, Fairymead, Gin Gin, Millaquin, and Qunaba Local Boards. J. G. Fitzsimon, Clerk of Petty Sessions, Childers—Chairman, Isis Local Board. T. W. Foran, Clerk of Petty Sessions, Mossman—Chairman, Mossman Local Board.

Similarly, Messrs. Aitkin, Carney, Gallagher, O'Brien, Baker, and Schafer, who held the appointment of Agent of the Central Sugar Cane Prices Board for the purpose of making inquiries in regard to sales and leases of assigned lands, have been relieved of such appointment, and Messrs. Rillie, Buxton, Kennedy, Aitkin, Fitzsimon, and Foran appointed to the vacancies occurring.

Mr. A. F. Moodie, Inspector of Stock, Slaughtering, and Dairies, has been transferred from Hughenden to Rockhampton.

Racecourse Mill Levy.

Regulations have been issued under the Primary Producers' Organisation and Marketing Acts empowering the Racecourse Central Mill Suppliers' Committee to make a levy of one penny per ton on all sugar-cane hauled over the Silent Grove tramline and supplied to the Racecourse Mill, such levy to be used for administrative purposes of the Silent Grove Cane Growers' Branch of the Racecourse Central Mill Suppliers' Committee.

Fifty per cent. of the growers concerned may petition for a poll on the question of making the levy, which must be lodged with the Department of Agriculture and Stock by 19th November next.

Bingera Mill Levy.

The Bingera Mill Suppliers' Committee is empowered, by Regulations issued recently, to make a levy of one farthing per ton on all sugar-cane loaded at Uping, McIlwraith, and Maroondan Sidings and supplied to the Bingera Mill, such levy to be used for administrative purposes of the Maroondan Branch of the Bingera Mill Suppliers' Committee.

Fifty per cent. of the growers concerned may petition for a poll on the question of making the levy, which must be lodged with the Department of Agriculture and Stock by 19th November next.

Barley Board Hail Insurance Scheme.

Certain amendments of and additions to the Barley Board Hail Insurance Scheme Regulations have been approved. These Regulations were passed in September, 1930, and provide for the payment of compensation to barley growers in respect of losses to crops sustained through hail storm damage. The Barley Board have requested amendments of the above to provide for the covering of crops partially out in ear, the furnishing of growers' returns, and the alteration of the conditions of appointment of umpires and payment to the Board of incidental costs when an appeal is not sustained.

The Wheat Board's Hail Insurance Regulations were similarly amended in September, 1933.

Veterinary Medicines Act Regulations.

On the recommendation of the Veterinary Medicines Board, the Regulations under "*The Veterinary Medicines Act of* 1933," which were issued in February last, have been rescinded, and new regulations issued in lieu thereof.

Banana Levy Extension.

Regulations were issued in September, 1933, under the Fruit Marketing Organisation Acts, empowering the Committee of Direction of Fruit Marketing to make a levy, at the rate of ½d. per case or 1d. per every £2 or part thereof, of the net proceeds realised from the sales of bananas marketed in the bunch from the district between Nerang and the Tweed. A regulation has been issued extending this levy for a further twelve months from 1st January, 1935.

A levy on growers of bananas in the State, excepting growers in the South Coast District (to whom a special levy applies) at the rate of 1d. for every £2 or part thereof of the net proceeds from sales, was approved in December last, and a regulation will empower the Committee of Direction of Fruit Marketing to enforce this levy for a further twelve months from 1st January, 1935.

Stanthorpe Fruit and Vegetable Levy.

A regulation approved under the Fruit Marketing Organisation Acts will empower the Committee of Direction of Fruit Marketing to enforce, for a further twelve months, the levy on growers of fruit and vegetables in the Stanthorpe area. The levy for the past twelve months has been at the rate of 1s. 6d. per ton of fruit and vegetables marketed, with a minimum of 1d. per consignment. The levy for the ensuing period, however, will be at the rate of 1s. 8d. per ton, and will be operative from 15th December, 1934.

Grade Standards for Cavendish Bananas.

An amendment of the Fruit and Vegetable Packing and Grading Regulations issued under "*The Fruit and Vegetables Act of* 1927" has been approved, which provides that the minimum length for the "Sixes" grade for Cavendish Bananas shall be 6 inches.

The regulations at present provide a minimum length of 5½ inches.

Apple Levy Regulation.

A regulation has been issued under the Fruit Marketing Organisation Acts, extending the Apple Levy Regulation, which was issued in November, 1933, for a further period of twelve months from 1st December, 1934. The levy applies to all fruitgrowers in the Stanthorpe district, and is at the rate of 1d. per bushel case of apples grown and marketed from this area. When any apples are railed from any station in the district the levy shall be computed at ¾d. per ton (40 bushel cases or 80 half-bushel cases = 1 ton). Where more than one grower contributes to any consignment, the total amount of levy in respect thereof shall be paid by such growers in proportion to the respective weights of their contributions. A minimum of 1d. shall apply for any one consignment.

Control of "Brumbies."

A Proclamation has been issued under the Diseases in Stock Acts, declaring the Cloncurry Stock District to be a district for the control of brumbies or wild horses for the period from 1st January, 1935, to 30th April, 1935.

New Containers Necessary in Trans-Border Trade.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) stated recently that considerable trouble was being experienced at Wallangarra by the holding-up of fruit and produce exported from Queensland to New South Wales because it was not contained in new cases or bags. Agents or other persons sending fruit and vegetables to New South Wales, if they wished to avoid delay at the border, and perhaps outright condemnation of their goods, must use new cases or bags in every instance, as provided by the New South Wales regulations.

An exception only was made in the case of pumpkins and onions, which could be consigned in sound, clean flour or sugar bags, provided they were accompanied by a certificate to this effect.

Papaw Levy Regulation.

A regulation has been issued under the Fruit Marketing Organisation Acts extending for a further twelve months the Papaw Levy enforced in December, 1933. The levy is operated by the Committee of Direction, and is at the rate of one penny for every four cases of papaws, or part thereof, marketed in Queensland.

Regulations under the Stock Foods Acts and the Pest Destroyers Act.

All existing Regulations under "*The Stock Foods Acts, 1919 to 1928*," and the Regulations under "*The Pest Destroyers Act of 1923*," have been rescinded, and new Regulations under both Acts have been issued in lieu thereof.

The new Regulations embody many of the original regulations, which have been brought up to date and generally improved.

Credit Still Rising—Australia's Position Abroad.

The report that Australian 5 per cent. loans in New York have reached par is yet another indication of the rehabilitation of Australia's credit abroad, according to an official statement issued from Canberra recently.

In American financial circles the opinion is expressed that the return of values was due to the conviction of the American public "of the complete stability of Australian economic affairs, and not to extraneous circumstances"; it is also pointed out that few other foreign issues in New York enjoy such high prices as Australian stocks.

In three years the market value of Australian 5 per cent. stocks in New York has more than doubled. They reached their lowest point on 15th December, 1931, when 5 per cent. 1957 stocks were quoted at 46. They had been falling steadily to this figure since the beginning of 1929, when they were selling at 96. They have been rising almost continuously ever since, as the following table shows:—

	5 Per cent. 1955.	5 Per cent. 1957.		5 Per cent. 1955.	5 Per cent. 1957.
15th January, 1929	96½	96	15th January, 1932	57½	57¾
15th July, 1929	95½	95½	15th June, 1932	61	61
15th January, 1930	92½	93	17th January, 1933	76¾	77⅛
16th June, 1930	88¼	88½	18th July, 1933	83½	83½
15th January, 1931	68	68	17th January, 1934	94	95
15th June, 1931	64¾	65	13th June, 1934	94⅛	94¼
15th December, 1931	46⅝	46	7th December, 1934	100	100

Bird Research in Germany.

The Minister for Agriculture and Stock (Mr. F. W. Bulcock) announced recently the receipt of a note through the Secretary of State for the Dominions (Mr. J. H. Thomas) from the German Ambassador in London regarding the activities of the German Bird Research Stations.

The Ambassador advises that more than 160,000 wild birds annually have rings attached to their feet at the two stations; the bird observatory of the State Biological Institution in Heligoland, and the Rossitte-Kurische Nehrung Bird Observatory of the Emperor William Society for the promotion of Science. Inscriptions and figures on the rings enable reports to be received from all quarters, and every year several thousand reports, from South Africa to the Arctic Ocean, reach the two bird observatories regarding their ringed birds. This work has results of scientific importance, and reveals quite new discoveries regarding bird migration and other phenomena of bird life. The two observatories are naturally very interested in receiving as large a number as possible of such reports relating to their ringed birds, and on receipt of these reports the precise information is forwarded, not only in regard to the particular case before them, but about their work generally. These observatories are prepared to compile and transmit reports which concern the ringing stations of foreign countries, and willingly supply printed matter relating to the tasks undertaken and the results of their work.

The German Ambassador is desirous that all British authorities and institutions concerned should be acquainted with the activities of their observatories, as scientific work depends on the interest and participation of the widest possible range of people. The Ambassador has given an assurance that the transmission of any notice of the finding of ringed birds to one of the two bird observatories would be gratefully acknowledged.

Egg Board Election.

The voting in connection with the election of a growers' representative for each of the Districts 2, 3, and 4 of the Egg Board resulted as follows:—

	Votes.
District No. 2 (Brisbane North-Redcliffe).	
Matthew Hale Campbell, Albany Creek	101
Raymond Harrison, The Gap, Ashgrove	38
Robert Auburn Chapman, The Gap, Ashgrove	23
District No. 3 (Brisbane South-Cleveland).	
Christian Gisler, Wynnum	130
*Tom Hallick	106
District No. 4 (Moreton).	
Johannes De Vries, Rosewood	104
*Alexander McLauchlan, Boonah	58
Henrich Jacob Jurgensen, Moogerah	42

*Present member.

Messrs. R. B. Corbett, Woombye (chairman), and W. T. Hughes, Middle Ridge, Toowoomba, were returned unopposed for the North Coast and Darling Downs respectively, and Mr. Campbell, a former Chairman of the Board, has been elected in place of the late Mr. A. A. Cousner, who previously represented the Brisbane North district.

The new Board will hold office for a term of one year as from the 1st January.

Dairy Products Stabilisation Board.

By an Order in Council issued on 8th February, 1934, the Dairy Products Stabilisation Board was constituted for a period of twelve months, and comprised the members of the Butter Board together with two members of the Cheese Board. An Order in Council has been issued to-day, amending the constitution of the Board to provide that the Board shall be continued for a further period until the 30th June next.

Rural Topics.

Sunshine Wheat Competition.

At a recent meeting of the Council of the Royal Agricultural Society of Victoria at Melbourne, the secretary reported that he had been advised by Messrs. H. V. McKay Massey Harris Pty. Ltd. that that firm had decided to continue for five years, commencing with the 1935 Melbourne Royal Show, its competition for the best bag of commercial wheat, under conditions similar to those applying to the 1934 competition, with the exception that condition No. 1 be altered to require that the exhibit shall represent a minimum of 50 acres of the variety of wheat exhibited. He had further been informed that prize money in connection with this competition would annually be: First, £8; second, £5; third, £2; with, in addition, £10 to be paid to the society through which the first prize exhibit is entered for the Melbourne Royal Show, also a suitably engraved trophy valued at £5 to be presented to the winner of the first prize. In concluding his report, the secretary drew attention to the fact that the twenty-five entries in this competition at the Centenary Show had represented wheat grown in Western Australia, South Australia, New South Wales, and Victoria.

At the instance of the president, it was unanimously decided to accept with pleasure the promised donation, and the fact that it was intended to continue the competition for five years was noted with appreciation.

This year the winners of the competition were:—1st—R. R. Wilson, Yeelanna, S.A. (variety, Ford); 2nd—A. R. Moulton, Berrigan, N.S.W. (variety, Pusa 4); 3rd—David Johnston, Dookie, Vic. (variety, Wardfir).

Wheatgrower's Records Prove Efficacy of Fallowing.

Striking proof of the efficacy of fallowing is afforded by figures published in a recent issue of the "Agricultural Gazette" of New South Wales. The figures comprise records of yields kept by Mr. W. W. Watson, of Tichborne, near Parkes, and show that, taking into account only strictly comparable years (when both fallow and stubble were cropped during the same year), stubble land averaged 12.84 bushels per acre and fallow land 19.04 bushels per acre, an increase of 48 per cent.

The statistics cover a period of thirty-one years—from 1903 to 1933. There are no exceptional circumstances or favoured conditions connected with Mr. Watson's farm, states the article, and although he farms soundly, he makes no attempt to produce record yields. Furthermore, the soil on which the crops were grown is quite average quality wheat land (a silty loam 9 in. deep, with a clay loam subsoil), while the rainfall and temperatures, as regards both degree and incidence, were such as might have been experienced in any average wheat district.

During the first period, 1903 to 1913, the land had the advantage of the natural humus content maintaining a suitable mechanical condition, and the farm yield from fallowed land was 20.6 bushels per acre. During the second period, 1914 to 1923, the humus content undoubtedly lessened and there was a tendency for the soil to set or cake and to be more difficult to work. This may have affected the yields, which showed a reduction to 17.7 bushels per acre, although the rainfall of the growing season averaged .24 inches greater than during the first period. The tendency for the soil to set, due to the lessening of the humus content, still persists (1934).

After the year 1923, a very appreciable increase in yield took place—namely, 5 bushels per acre for the ten-years' period 1924 to 1933, raising the acre yield to 22.7 bushels, even though the average rainfall during the growing seasons was .72 inches less than for the second period (1914 to 1923). This increased yield is largely attributable to the improved structural condition of the fallowed land, which from 1923 onwards conformed to the principles as at present advocated. This provides for a firm seed-bed, which is essential for a satisfactory germination and is conducive to the best results from superphosphate.

Prior to 1923 fallowed land was merely that which had been ploughed during the previous winter and kept clean until seeding time. Field competitions, commencing in the early twenties, taught the why and the wherefore of the details of fallow workings, and when these were put into practice up went the yields.

In the following table fallow-sown and stubble-sown wheat are combined, the figures thus showing the results of the whole of the wheat-growing operations on Mr. Watson's farm for the different periods. The increases in area cropped and acre yields are very striking. The yield increase is due first to a greater proportion of fallow, supplemented during the last period by a well-prepared fallow, which made soil conditions more suitable for the action of superphosphate,

and also to the introduction of better varieties, pure seed, and the copper carbonate treatment of seed wheat.

Period.	Average Area Sown.	Average Acre Yield.	Increased Yield.	
	Acres.	Bushels.	Bushels.	Per Cent.
1903 to 1913	231·5	14·9	..	..
1914 to 1923	339	16·2	1·3	8.7
1924 to 1933	565	21·1	6·2	41·6

From 1910 to 1925 Mr. Watson kept records of the yields from manured (56 lb. superphosphate per acre) and unmanured areas. Averaging the yields according to the periods shown in the above table, the increases due to the use of superphosphate were as follows:—

Period 1910-13—1.6 bushels per acre increase.

Period 1914-23—1.0 bushels per acre increase.

Period 1924-25—7.0 bushels per acre increase.

The reason for terminating the trials in 1925 was that the increases for 1924 and 1925 were so great as to indicate that further tests were unnecessary. Moreover, there was the loss each year from the unmanured areas to be considered.

The figures show that up till the end of the second period there was no appreciable increase in yield brought about by the use of superphosphate. The reason, no doubt, is that the fallows during those periods were loose and there was no compact seed-bed. With a change in fallowing methods, as demonstrated by field competitions about this time, there was an immediate response to the use of superphosphate, and Mr. Watson still assesses the increase at 6 bushels per acre.

Orchard Notes for March.

THE COASTAL DISTRICTS.

IF the weather is favourable, all orchards, plantations, and vineyards should be cleaned up, and the ground brought into a good state of tilth so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations must be kept free from weeds, and suckering must be rigorously carried out, as there is no greater cause of injury to a banana plantation than neglect to cultivate. Good strong suckers will give good bunches of good fruit, whereas a lot of weedy overcrowded suckers will only give small bunches of undersized fruit that is hard to dispose of, even at a low price.

Cooler weather may tend to improve the carrying qualities of the fruit, but care must still be taken to see that it is not allowed to become over-developed before it is packed, otherwise it may arrive at its destination in an over-ripe and consequently unsaleable condition. The greatest care should be taken in grading and packing fruit. Only one size of fruit of even quality must be packed. Smaller or inferior fruit must never be packed with good large fruit, but must always be packed separately as required by regulation.

During recent weeks there has been a marked increase in the banana thrips population in those districts in which this pest is well established. Growers who consider it necessary to deal with banana thrips are advised that so far nicotine dusts applied at weekly intervals have given the most promising results. The dusts may be applied by means of an inexpensive hand dust gun, or by a rotary duster to which a special flexible outlet pipe has been fitted.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, will be completed in the course of the month, and as soon as the fruit is disposed of plantations, which are apt to become somewhat dirty during the gathering of the crop, must be cleaned up. All weeds must be destroyed, and if blady grass

has got hold anywhere it must be eradicated, even though a number of pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be well worked and brought into a state of thorough tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They will not be fully coloured, but they can be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered whilst still sour and green.

As blue mould is likely to cause heavy loss in coastal citrus, especially in long distance consignments, special precautions should be taken for minimising this loss. It must be remembered that the blue mould fungus will only attack bruised or wounded fruit. Hence it is necessary to be careful that no injuries are given by the clippers or finger nails during picking. Fruit should be cut and not pulled. Long stalks which may injure other fruit must be avoided.

The fruit must be carefully handled and accurately packed so as to avoid bruising. Any injured fruit should be discarded. In order to reduce the number of fungus spores present in the plantation all waste fruit in the orchard or packing shed should be collected at frequent intervals and destroyed by fire or burying.

Fruit must be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The flat bushel-case (long packer) commonly used for citrus fruits does not lend itself to up-to-date methods of grading and packing, and we have yet to find a better case than the American orange case. Failing this case, a bushel-case suggested by the New South Wales Department of Agriculture is the most suitable for citrus fruits, and were it adopted it would be a simple matter to standardise the grades of our citrus fruit, as has been done in respect to apples packed in the standard bushel-case used generally for apples throughout the Commonwealth. The inside measurements of the case suggested are 18 in. long, 11¾ in. wide, and 10½ in. deep. This case has a capacity of 2,200 cubic inches, but is not included in the schedule of the regulations under "*The Fruit Cases Acts*, 1912-1922." The half-bushel case, No. 6 of the Schedule above referred to, is 10 in. by 11¾ in. by 5¼ in. inside measurements with a capacity of 1,100 cubic inches. The case should be suitable for oranges and the half-case for mandarins. No matter which case is used, the fruit must be sweated for seven days before it is sent to the Southern markets, in order to determine what fruit has been attacked by fruit fly, and also to enable bruised or injured fruit liable to blue mould to be removed prior to despatch.

Growers are reminded that the control of the bronze orange bug is best achieved by spraying with the resin-caustic soda-fish oil mixture normally either late in March or early in April. Applied at this time of the year the spray can give a mortality of 98 per cent. of the bronze bugs which are then present solely in the very young stages. This spray is also very effective against several of the important scale insects infesting citrus.

Red scale is a pest to which citrus growers will shortly have to give attention, it being considered that control is best established from the middle of March to early in April. Fumigation with hydrocyanic acid gas is most effective against red scale, but success may also be achieved with white oils or with the resin-caustic soda-fish oil mixture evolved for the control of the bronze orange bug. Red scale, of course, is pre-eminently a pest of the hotter drier citrus districts.

Strawberry planting may be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

THE advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be followed carefully. The later varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets, the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been published by the Department, which advice and instruction should enable the growers in that district to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes. Those who are not expert cannot do better than follow the methods of the most successful packers.

As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of the want of water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening stage, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much moisture is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light watering is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

Farm Notes for March.

LAND on which it is intended to plant winter cereals should be in a forward stage of preparation. Sowings of lucerne may be made at the latter end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has much in its favour, not the least of which is that weeds will not make such vigorous growth during the succeeding few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Seed wheat should be treated with copper carbonate for the control of bunt. For oats and barley seed the use of formalin or a reliable mercury dust is advisable.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where the potato crop is subject to Irish blight it is advisable to spray the plants for the control of this disease. Bordeaux mixture of 4.4.40 strength should be applied at least three times at intervals of ten days to a fortnight, commencing when the plants are about six weeks old.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Selected grain which is intended for future seed supplies should be well fumigated for thirty-six hours and subsequently aerated and stored in airtight containers. The germination of the maize is not normally affected by this treatment if dry and mature when treated.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Owing to the small nature of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be paid to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials of success in dairying operations, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods allotted for the successive sowings of seed.

The early-planted cotton crops should be now ready for picking. This should not be done while there is any moisture on the bolls, either from showers or dew. Packed cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bags, or hessian sheets, before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *Phalaris bulbosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops which show no promise of returning satisfactory yields of grain would be well advised to convert these into ensilage to be used for winter feed. This, especially when fed in conjunction with lucerne or cowpea, is a valuable fodder. Where crops of Soudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reached a suitable stage for converting into ensilage, it will be found that this method of conserving them has much to recommend it. Stacking with a framework of poles, and well weighting the fodder, is necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full cave and held in position by means of weighted wires.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

A MISCHIEVOUS DELUSION.

HOW often one hears the word "teething" in the conversations of mothers about their babies! Even in these days many mothers make the mistake of explaining all kinds of illnesses by saying that the baby is teething. "Only teething" is a phrase which has killed many infants, and caused many more to grow up weak and sickly. Healthy babes never show any serious disturbance of health from this cause, though rarely they may be a little restless and dribbling. When there appears to be really some pain in the gums the infant is usually feverish or ill from some other cause, and when this is removed his teeth cease to trouble him. The ailments which have been put down to teething are so many that we can mention only a few of them.

Digestive Upsets.

Perhaps these are the commonest of all. How often we hear loose, green frequent motions calmly referred to as "just teething," and how often we have to explain that the real cause is something the baby has swallowed! His mother has been overfeeding him, or giving him unsuitable food, or letting someone else do so, or he may have picked it up for himself. It happens that the teething age is the weaning age, and it is the time when these mistakes are most common. It is no help to the babe to blame his teeth, though it may comfort a careless mother, and encourage her in her foolish feeding, until the consequences become serious.

Skin Rashes.

One sometimes sees an infant with an irritable rash on the skin, most frequently in the napkin area. This might be prevented by care and cleanliness. When the mischief has been done it may be cured by simple treatment; but if the mother persuades herself that it is "just his teeth," the infant continues to suffer until it becomes so distressed that she has to see a doctor. Even measles have been put down to teething! There is no such thing as a "teething rash."

Feverish Attacks.

Babies and young children easily get feverish from all sorts of causes, but not from their teeth. The most common are the infections known as "common colds" and influenza, but there are many others, such as tonsilitis, measles, scarlet fever, diphtheria, and dengue.

Earache.

Perhaps the most serious mistake of all is to attribute earache to teething. Inflammation of the ear behind the drum is very common in

children and may occur in any of these infections. An older child may be able to tell you about the pain; the young baby cannot. He is fretful and keeps crying and perhaps pulling at his ears. At night he may be restless, rolling his head on the pillow, and frequently waking with sharp cries of pain. Unless promptly treated, an abscess forms and the child may be very sick indeed. When this bursts there is a discharge of matter and the pain is relieved. It is then a serious responsibility to see that the ear heals rapidly and completely and does not become a cause of deafness and a menace to the child's future health.

IN THE FARM KITCHEN.

JAM MAKING.

IN order to get the best results, good fruit in the best condition must be used. The fruit must be ripe, but not over-ripe; jam made from green peaches or imperfect fruit of any kind may be fit to use, but it does not keep well and cannot be compared with a preserve made from properly developed and fine fruit.

All fruits must be thoroughly cleaned.

Citrus fruits, pie melons, and rosellas should be prepared the day before the jam is made.

Apricots, nectarines, and peaches must be carefully peeled and stoned; the kernels of about one-quarter of the stones should be blanched and added to the fruit after the sugar has been added.

Plums must not be peeled; the stones may or may not be removed.

Berries such as gooseberries, mulberries, raspberries, and strawberries should be washed and dried carefully.

Fruit prepared the previous day must be kept in earthenware dishes; piemelons should be sprinkled with a small amount of sugar and allowed to stand for 12 hours; citrus fruits when cut up should be kept in earthenware dishes; a small quantity of water should be added; the seeds and stalks of rosellas are removed and kept in one dish; the remainder of the fruit is placed in another dish.

To all fruits sufficient water is added to prevent the fruit sticking to the preserving pan.

Berries and sugar are placed in the pan together; these fruits should not be stirred in such a way that they are mashed or broken.

In making jam from apricots, citrus fruits, melons, peaches, pears, pineapples, plums, quinces, and rosellas the fruit must be boiled till tender before the sugar is added. The cooking must be slow.

The amount of sugar to be used varies from half a pound to one pound to the pint of cooked pulp; it depends upon (*a*) the kind of fruit; (*b*) its condition.

Scum rises freely while some fruits are being cooked; if it forms a thick toughish layer it must be removed.

The time required for cooking varies; in the case of berries the time must not exceed 30 minutes; apricots, damsons, and firm peaches require one hour; melons, pear, pineapples, and quinces may require two hours before the sugar is added, and from half an hour to one hour afterwards. Cooking is completed if a small portion of the fruit sets when dropped from a spoon on a cool surface.

If jam or jelly is boiled too long it will not set.

Most jams should be bottled and sealed down while hot; jams made from berries should be allowed to cool before bottling if bottled while hot the berries rise to the top of the bottle.

Bottles may be covered with white paper dipped in white of egg or boiled starch; if corks are used they should be dipped in melted wax and forced into the bottle, the top should then be covered with wax. If the bottles have lids, care must be taken to screw them down tightly.

In dry sunny weather jam made from first class fruit, after bottling, may be allowed to stand for 24 hours before being sealed; the bottles should be covered with cheese cloth to keep off dust; a layer of melted parowax should then be poured over the surface in each bottle; the bottles may be covered with paper; preserves treated in this way should keep for months.

Apricot Jam.

Materials—Apricots; 1 lb. crystallised sugar to each pound of fruit weighed without kernels.

Utensils—Knife; dish; preserving pan; saucepan; basin; jam jars; wooden spoon.

Method—

1. Peel apricots; cut them into halves.
2. Remove stones; crack stones and remove kernels.
3. Put ½ of the kernels into cold water; bring to boil and peel.
4. Put apricots and sugar into a bowl in layers; allow fruit to stand 12 hours.
5. Put fruit and syrup into preserving pan with remainder of sugar, blanched kernels, and water.
6. Allow to cook slowly until apricots are soft and transparent.
7. When slightly cool pour into warm jars.
8. Cover down air-tight.

Note.—Apricot jam may be made without peeling apricots.

Apricot Jam made from Dried Apricots.

Materials—1 lb. dried apricots; 8 cups boiling water; 8 cups sugar; 3 lemons; 6 blanched almonds.

Utensils—Bowl; cup; wooden spoon; squeezer.

Method—

1. Put apricots into a bowl; cover with cold water.
2. Wash fruit well; drain; cut fruit into halves; return apricots to bowl.
3. Cover with boiling water; allow to stand till the apricots are well soaked and plump.
4. Put fruit and water into a preserving pan.
5. Boil till the fruit is clear; add sugar, lemon juice, and almonds.
6. Boil till a small quantity jellies on a saucer.
7. Bottle; seal; cover securely.

Note.—Any dried fruit may be used in this way.

Cape Gooseberry Jam.

Materials—1 lb. of sugar to each pound of fruit.

Utensils—Bowl; sieve; cloth; preserving pan; wooden spoon; jars.

Method—

1. Wash fruit; pick it over carefully; drain and dry fruit.
2. Bruise some ripe berries in the bottom of the preserving pan.
3. Boil for 15 minutes; add remainder of fruit.
4. Add sugar; boil for 1 hour.
5. Let the jam stand in the preserving pan till it is cool.
6. Bottle and cover.

Fig Jam.

Materials—Water; salt; ¾ lb. sugar to each pound of pulp and pint of water; to each pound of figs the juice of 1 lemon and grated rind of ½ a lemon.

Utensils—2 bowls; knife; preserving pan; wooden spoon; lemon squeezer; grater; cup; bottles or jars; corks; covers, or paper.

Method—

1. Cut off half the stem of firm ripe figs; soak them for 12 hours in water to which a little salt has been added.
2. Drain; wash in warm water; split the fruit in halves.
3. Put ¾ lb. sugar and 1 pint of water for each pound of fruit into a preserving pan.
4. Add lemon rind and juice; allow to boil for 10 minutes.
5. Add figs; boil until the fruit is clear.
6. Bottle while hot; cover securely.

Note.—Instead of lemons, pineapple may be added in making this jam, in the proportion of 1 lb. pineapple to 3 lb. figs.

Grape Jam.

Materials—5 lb. grapes, 2½ lb. sugar.

Utensils—Preserving pan; jam jars; wooden spoon; skimmer.

Method—

1. Wash firm, under-ripe grapes.
2. Put fruit and sugar in layers into a preserving pan, allowing ½ lb. of sugar to 1 lb. fruit.
3. Set pan near fire until juice flows.
4. Boil, stirring occasionally.
5. Remove seeds as they rise.
6. When half a teaspoonful jellies on a cold plate, remove from fire.
7. Allow to cool a little; bottle in warm jars; cover down air-tight.

Note.—If the skins are touch and seeds are plentiful, this jam may be rubbed through a coarse sieve.

Isabella Grape Jam.

Materials—Partially ripe Isabella grapes; 1 cup of sugar to each cup of skin and pulp.

Utensils—Preserving pan; bowl; cup; wooden spoon; jars.

Method—

1. Squeeze the pulp out of the skins.
2. Boil the pulp and seed until seeds are separated from pulp.
3. Strain through a colander to remove seeds.
4. Measure skins and trained pulp.
5. Put skins, pulp, and sugar into a preserving pan.
6. Boil until a small quantity jellies on a cool surface.

Melon and Pineapple Jam.

Materials—Piemelon; pineapple; ¾ lb. sugar to each lb. of pulp.

Utensils—Preserving pan; knife; cup; jars.

Method—

1. Cut off pineapple ends; break pulp from core with a fork.
2. Peel melon; cut pulp into pieces, removing seeds.
3. Put melon into a preserving pan; add enough water to keep the pulp from burning.
4. Boil till tender; measure melon and pineapple.
5. Add ¾ cup of sugar to 1 cup of pulp.
6. Boil till a small quantity allowed to drop on a plate sets.
7. Put into jars; cover; label.

CITRUS FRUITS IN THE KITCHEN.

Orange Delight.—Peel and remove the pith of six oranges. Slice thinly in rings, removing the seeds. Arrange in a glass dish or a pyrex, and sprinkle with sugar. Pour a rich boiled custard over the top. Make a meringue with the whites of eggs and head it on top of custard, then garnish with grated orange peel. Set meringue in oven; stand the glass in pan of water while in the oven.

Orange Quarters.—Take three oranges, ½ teaspoon citric acid or juice of two lemons, 2 cups hot water, 1 tablespoon brandy or sherry, little cochineal, and 3 dessertspoons gelatine. Cut oranges in halves, scoop out centre, leaving only the skins; do not break them. Dissolve gelatine, sugar in hot water, add acid or lemon juice, sherry or brandy, and colour half the mixture wtih a few drops of cochineal. When cool pour mixture into shells or skins, and allow to set. Serve on a bed of green leaves.

Orange Compote.—Take ½ pint of water, ¼ lb. sugar, and six oranges. Peel oranges, divide into sections, boil sugar and water with shreads of orange peel. Take out the peel and put the orange sections in the syrup and simmer gently ten minutes. Take out and arrange in a glass dish. Add a couple of sheets of gelatine dissolved in water to the syrup and allow syrup to cool a little; then pour over the oranges.

Lemon Trifle.—Items required are 3 cups water, 1½ cups sugar, juice and rind of two lemons, 2 tablespoons arrowroot, and whites of two eggs. Boil the water, sugar, and lemon juice together, then add the blended arrowroot, and when cooked add the stiffly-beaten whites. Serve cold with custard made from yolks.

Orange or Lemon Shape.—Take 3 eggs, ½ oz. gelatine, 2 oz. sugar, cup of hot water, rind of a lemon grated, and juices 2 oranges or lemons. Soak gelatine in hot water, whip whites of eggs till stiff; gradually pour on gelatine and water, beating all the time, beat yolks and add sugar, beat all together. Pour into a wet mould till set.

THE PREPARATION OF CHUTNEYS.

In chutney making there is scope for individual taste and ingenuity in combining different ingredients to give a distinctive flavour. Acid fruits, such as apples, gooseberries, plums, ripe tomatoes and green tomatoes are bases for chutney, and onions, garlic, raisins, dates, sugar, spices, are added according to taste, and the whole mixed with vinegar. The vinegar and the spices are the preserving agents. A good chutney, whatever the ingredients, should be smooth to the palate, and should have a mellow flavour. To obtain this result, it is necessary to cut up all the ingredients finely, and to cook them very slowly for two hours or longer. Long and slow cooking is essential. The addition of raw materials, such as chopped onion or garlic immediately before the chutney is bottled is not advisable, as they destroy the smooth texture and do not give such a good flavour as when cooked with the other ingredients. It is sometimes necessary to put certain ingredients through a sieve, and in that case a hair one should always be used, as metal sieves usually give an unpleasant metallic taste to the chutney. For this reason also, the use of brass, copper, or iron pans during the preparation should be avoided; enamel-lined, monel metal or aluminium pans should be used.

In bottling chutney, the bottles should be clean, dry and hot. The chutney should be bottled hot, and the bottles immediately sealed. If they are to be sealed by means of bladder or parchment paper, however, the chutney should be allowed to cool down before sealing. If corks are used, they should be heated in hot water at about 170 deg. F., and then covered with a circle of grease-proof paper and placed in the bottle or jar. The seal may then be dipped in melted paraffin wax to make the cork airproof. If metal-capped jars are used, wax circles, such as are used for jam, should be inserted between the metal and the chutney.

Gooseberry Chutney Recipes.

(1) 1½ lb. gooseberries
3 oz. stoned raisins
5 oz. sugar
4 oz. onions
½ oz. salt
½ oz. mixed spice
¼ oz. crushed mustard seed
½ pint vinegar

The onions should be chopped and cooked in a little water till tender, and the water drained off. The gooseberries should be topped, tailed and washed, placed in a pan and the cooked onions, raisins, crushed mustard seed, spice, salt, and vinegar added. The chutney should be simmered for an hour or until it is of thick consistency.

(2) 3 lb. green gooseberries
¾ lb. stoned raisins
2 lb. brown sugar
2 tablespoonsful mustard seed
2 tablespoonsful ground ginger
2 tablespoonsful salt
½ teaspoonful cayenne
½ teaspoonful turmeric powder
3 onions
2 pints vinegar

The onions and raisins should be chopped, the gooseberries topped and tailed, and the mustard seed crushed. All the ingredients should be put into a pan, brought to boiling point and simmered slowly for 1½ hours or until the ingredients are quite tender.

Apple Chutney Recipes.

(1) 6 lb. apples
2 lb. onions
3 lb. brown sugar
½ lb. preserving ginger
¼ teaspoonful cayenne
2 heads garlic
Salt to taste
4 pints vinegar

The apples should be peeled, cored, and cut up into very small pieces and the onions sliced very finely. All the ingredients should be mixed with the vinegar in a preserving pan and boiled gently for 2½ hours or until the chutney becomes very thick.

(2) 7 lb. green apples
2 lb. sultanas
4 lb. brown sugar
1 lb. preserving ginger
1 teaspoonful cayenne
1 oz. garlic
1 teaspoonful spice
1 teaspoonful salt
1 quart vinegar

The apples should be peeled and sliced and boiled with the brown sugar until fairly thick. The choped ginger, sultanas, garlic, and spices should be added and boiled for twenty minutes. The vinegar should then be mixed in and simmered until the mixture has the requisite consistency.

(3) 4 lb. green apples
1 lb. raisins
½ lb. sugar
½ lb. preserved ginger
1 pint vinegar

The apples, raisins, and ginger should be chopped very finely; the sugar and vinegar added, brought to boiling point and simmered till of thick consistency.

Marrow and Apple Chutney.

2 lb. marrow
½ lb. shallots
1 lb. green apples
½ lb. sugar
½ oz. bruised whole ginger, chillies, and peppercorns
1½ pints vinegar

The marrow should be cut into small pieces and placed in a basin with salt between each layer, left for twelve hours, and then drained well. The marrow, apples, and onions should be chopped finely; the spices tied in muslin; and the ingredients, except vinegar, put in a saucepan and cooked until tender; the vinegar should then be added, and the chutney cooked until it reaches the consistency of jam.

Green Tomato Chutney Recipes.

(1) 4 lb. green tomatoes
1 lb. apples
½ lb. stoned raisins
1 lb. brown sugar
½ oz. bruised ginger
12 red chillies
2 oz. garlic
1 lb. shallots
1 pint vinegar

The tomatoes should be sliced, the apples, shallots, and raisins chopped, and all the ingredients placed in a pan, brought to the boil, and cooked until the chutney has the consistency desired.

(2) 5 lb. green tomatoes
3 lb. green apples
1 lb. moist sugar
1½ lb. chopped onions
1 saltspoonful cayenne
½ teaspoonful cloves and peppercorns
¼ saltspoonful cinnamon
1 quart vinegar

The tomatoes should be peeled and sliced, placed in a basin with salt between each layer, left for twelve hours and then drained. They should then be placed in a saucepan with the other ingredients, brought to the boil and simmered until quite tender.

(3) 1 lb. green tomatoes or apples
½ lb. onions
2 bananas
½ lb. raisins
¼ lb. preserved ginger
¼ oz. cayenne
1 oz. salt
¾ lb. brown sugar
1¼ pints vinegar

The tomatoes and bananas should be sliced, the onions, raisins, and ginger chopped and all ingredients placed in a pan, brought to the boil and simmered slowly until of a thick consistency.

Ripe Tomato Chutney.

Spiced vinegar	12 lb. tomatoes
1 pint vinegar	1½ lb. sugar
¼ oz. cinnamon bark	1½ oz. salt
¼ oz. whole allspice	Pinch cayenne
¼ oz. Penang cloves (stalks only)	¼ oz. paprika
¼ oz. blades of mace	2 fluid oz. Tarragon or Chili vinegar

The spices (tied in muslin) should be added to the vinegar, brought to the boil and allowed to infuse for two hours. The tomatoes should be blanched for one minute in boiling water, the skins and hard cores removed, cut up, and simmered until a thick pulp is obtained. The other ingredients should be added and the strained spiced vinegar. The chutney should be cooked until it is of a very thick consistency.

Date Chutney.

1 lb. stoned dates	½ oz. garlic
¼ lb. stoned raisins	¼ oz. salt
¼ lb. shallots or onions	6 red chillies
¼ lb. sugar	1 pint vinegar

The dates, raisins, and onions should be chopped finely, put in a pan with the other ingredients, and boiled until tender.

TO STIMULATE DECOMPOSITION.

If a compost heap of garden refuse is being formed, a mixture of ammonium sulphate two parts, ground rock phosphate one part, and ground limestone one part is a good decomposing mixture. Use about 2 cwt. per ton of refuse.

TO CLEAN SUPER. BAGS.

Soak in lime water. Sulphuric acid will combine with the lime to form sulphate of lime (gypsum), which is harmless to the bags and almost insoluble. A wash afterwards in clean water should remove practically all the gypsum and leave the bags suitable for most purposes.

TO UNSCREW WATER-TAPS.

Tank-taps can be unscrewed for repairs with little waste of water. Partly fill a strong sugar-bag with sand, tie it firmly to a long pole, and lower into tank till it can be pressed firmly against tap aperture; then unscrew the tap. Pressure of water will force the sandbag into the hole, closing it till the tap has been repaired. In this way also the extra piping can be attached to the tank without waiting till it is empty.

LOOSE LAMP-TOPS.

To fix metal tops on kerosene lamps, scrape all the old cement from brass top and glass reservoir, and wash both well in soapy water to remove the kerosene. Make a smooth paste (about as thick as butter) of plaster of Paris and water, spread it thinly on brass and glass, and put the socket firmly into position. See that it is straight, as the plaster sets quickly. Wipe off any which oozes out on the glass. Mended in the morning, the lamp can be filled and used same night. A tablespoonful of plaster will mend three or four lamps, but mix only for one at a time.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING DECEMBER, 1934, AND 1933, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.,	No. of Years' Records.	Dec., 1934.	Dec., 1933.		Dec.,	No. of Years' Records.	Dec., 1934.	Dec., 1933.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	7·60	33	0·69	7·60	Clermont	3·92	63	0·91	1·97
Cairns	9·03	52	1·45	7·65	Gindie	2·84	35	1·85	0·95
Cardwell	8·44	62	1·35	22·03	Springsure ..	3·23	65	5·50	0·86
Cooktown	6·83	58	1·03	6·23					
Herberton	5·87	48	1·94	4·43					
Ingham	7·21	42	0·77	18·50					
Innisfail	12·20	53	0·39	18·92					
Mossman Mill ..	11·25	21	1·82	11·39	*Darling Downs.*				
Townsville	5·64	63	0·80	11·41					
					Dalby	3·23	64	8·43	2·24
Central Coast.					Emu Vale ..	3·49	38	5·37	3·70
					Hermitage ..	2·92	28	3·50	2·40
Ayr	4·10	47	0·13	2·38	Jimbour	3·19	46	7·88	1·87
Bowen	4·48	63	1·50	3·73	Miles	3·07	49	8·37	3·02
Charters Towers ..	3·38	52	0·22	1·77	Stanthorpe	3·54	61	6·47	5·14
Mackay	7·26	63	2·07	5·75	Toowoomba ..	4·42	62	7·38	4·43
Proserpine	8·11	31	2·29	4·81	Warwick	3·40	69	5·07	3·68
St. Lawrence ..	4·81	63	5·41	3·41					
South Coast.									
Biggenden	4·59	35	9·04	6·74	*Maranoa.*				
Bundaberg	5·06	51	5·21	9·48					
Brisbane	4·95	83	9·82	5·20	Roma	2·51	60	4·70	1·18
Caboolture	5·29	47	7·16	12·39					
Childers	5·69	39	4·99	9·96					
Crohamhurst ..	6·92	40	..	16·24					
Esk	4·71	47	6·71	5·56					
Gayndah	4·15	63	6·84	2·87					
Gympie	6·04	64	8·11	9·24	*State Farms, &c.*				
Kilkivan	4·51	55	8·40	6·72					
Maryborough ..	5·09	63	6·96	9·67	Bungeworgorai ..	2·91	20	4·95	0·92
Nambour	6·97	38	7·65	13·71	Gatton College ..	3·65	35	..	4·48
Nanango	3·83	52	5·45	4·21	Kairi	6·52	20	1·80	9·70
Rockhampton ..	4·85	63	3·55	4·00	Mackay Sugar Experiment Station	8·41	37	1·82	5·72
Woodford	5·69	47	4·00	11·15					

J. H. HARTSHORN, Acting Divisional Meteorologist.

CLIMATOLOGICAL TABLE—DECEMBER, 1934.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure, Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·77	93	71	103	7,9,27	60	7	103	3
Herberton	..	87	62	96	26	49	11	198	2
Rockhampton	29·82	91	69	96	30,31	61	3	355	10
Brisbane	29·85	82	65	97	31	58	11	982	16
Darling Downs.									
Dalby	29·82	84	60	92	8	44	2	843	11
Stanthorpe	..	77	54	87	19	40	2	647	15
Toowoomba	..	78	58	86	8,16,20	47	1	738	14
Mid-Interior.									
Georgetown	29·79	99	72	106	26,31	61	11, 31	35	2
Longreach	29·78	101	68	109	23	54	1	5	1
Mitchell	29·81	91	61	99	8,17,18, 20	49	1	165	8
Western.									
Burketown	29·79	99	76	110	26	68	3	0	..
Boulia	29·80	101	72	112	23	58	2, 3	0	..
Thargomindah	29·80	95	70	110	16,17	58	9, 10	85	3

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	February. 1935.		March. 1935.		Feb., 1935.	Mar., 1935.
	Rises.	Sets.	Rises.	Sets.	MOONRISE. Rises.	Rises.
					a.m.	a.m.
1	5·25	6·46	5·45	6·25	2·10	12·56
2	5·26	6·45	5·45	6·24	3·16	2·2
3	5·27	6·45	5·46	6·23	4·26	3·12
4	5·27	6·44	5·46	6·21	5·41	4·22
5	5·28	6·43	5·47	6·20	6·46	5·31
6	5·29	6·43	5·48	6·19	7·56	6·37
7	5·30	6·42	5·48	6·18	9·1	7·44
8	5·30	6·42	5·49	6·17	10·7	8·51
9	5·31	6·41	5·50	6·16	11·8	9·57
10	5·32	6·40	5·51	6·15	12·13	11·1
					p.m.	
11	5·33	6·39	5·51	6·13	1·12	12 noon
					p.m.	
12	5·33	6·39	5·52	6·12	2·9	12·57
13	5·34	6·38	5·52	6·11	3·3	1·47
14	5·35	6·37	5·53	6·10	3·52	2·38
15	5·36	6·36	5·54	6·9	4·36	3·15
16	5·36	6·36	5·54	6·8	5·14	3·49
17	5·37	6·35	5·55	6·7	5·46	4·21
18	5·38	6·34	5·55	6·6	6 18	4·48
19	5·39	6·34	5·56	6·5	6·48	5·17
20	5·39	6·33	5·56	6·4	7·17	5·47
21	5·40	6·33	5·57	6·3	7·45	6·19
22	5·41	6·32	5·57	6·2	8·13	6·51
23	5·42	6·31	5·58	6·1	8·48	7·25
24	5·42	6·30	5·58	6·0	9·24	8·5
25	5·43	6·29	5·59	5·59	10·6	8·53
26	5·43	6·28	5·59	5·58	10·56	9·47
27	5·44	6·27	6·0	5·57	11·53	10·46
28	5·44	6·26	6·0	5·55	..	11·48
29			6·1	5·54		a.m.
30			6·1	5·53		12·54
31			6·2	5·52		2·4

Phases of the Moon, Occultations, &c.

4 Feb.	●	New Moon	2 27 a.m.
10 „	☾	First Quarter	7 25 p.m
18 „	○	Full Moon	9 17 a.m.
26 „	☽	Last Quarter	8 14 p.m.

Perigee, 4th February, at 9.24 a.m.
Apogee, 18th February, at 9.12 p.m.

Mercury, on 1st February, will be at its greatest elongation, 18 degrees east of the Sun. This will enable it to remain above the western horizon almost an hour after sunset.

Although a partial eclipse of the Sun will occur about 3 o'clock in the morning of the 4th, it will, of course, be invisible in Australia, but at Montreal, where it will occur about midday on the 3rd, local time, not quite half of the Sun's face will be obscured by the Moon.

The Moon will pass from west to ease of Saturn 4 degrees on its northern side at 4 a.m. on the 5th, 2¾ hours before rising at Warwick. Five hours later it will pass 2 degrees north of Mercury and 5 degrees to the northward of Venus at 1 p.m. on the 5th.

Mercury will get almost in a line with the Sun on the 17th, but being 3 degrees farther north there will be no possibility of a transit.

Saturn, on the 20th, will be on the far side of its orbit, about 886 million miles beyond the Sun, and almost in a line with it, and, of course, entirely invisible.

On the 25th, when the Moon rises at Warwick (10.6 p.m.), it will be followed 13 minutes later by Jupiter, 6 degrees further north.

When Mars reaches Right Ascension 13.35 on the 27th, it will become stationary and then retrograde, getting back to Right Ascension 13.30 on the 14th March, almost the same place as on 13th February.

Mercury sets at 7.44 p.m. on the 1st, and at 6.46 p.m. on the 14th.

Venus sets at 7.48 p.m. on the 1st, and at 7.54 p.m. on the 14th.

Mars rises at 10.16 p.m. on the 1st, and at 9.34 p.m. on the 14th.

Jupiter rises at 11.46 p.m. on the 1st, and at 11.0 p.m. on the 14th.

Saturn sets at 7.46 p.m. on the 1st, and at 6.59 p.m. on the 14th.

The Southern Cross, which was at VI. at 6 p.m. on 1st January, and did not come into view till about 9 p.m., will be two hours earlier this month, and be visible all night.

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5 March	●	New Moon	12 40 p.m.
12 „	☾	First Quarter	10 30 a.m.
20 „	○	Full Moon	3 31 p.m.
28 „	☽	Last Quarter	6 51 a.m.

Perigee, 4th March, at 9.54 p.m.
Apogee, 17th March, at 2.36 p.m.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S. add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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